ELECTRICAL SOUTH

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Recommended footcandle values continue upward trend—pg. 20

OCTOBER 1957

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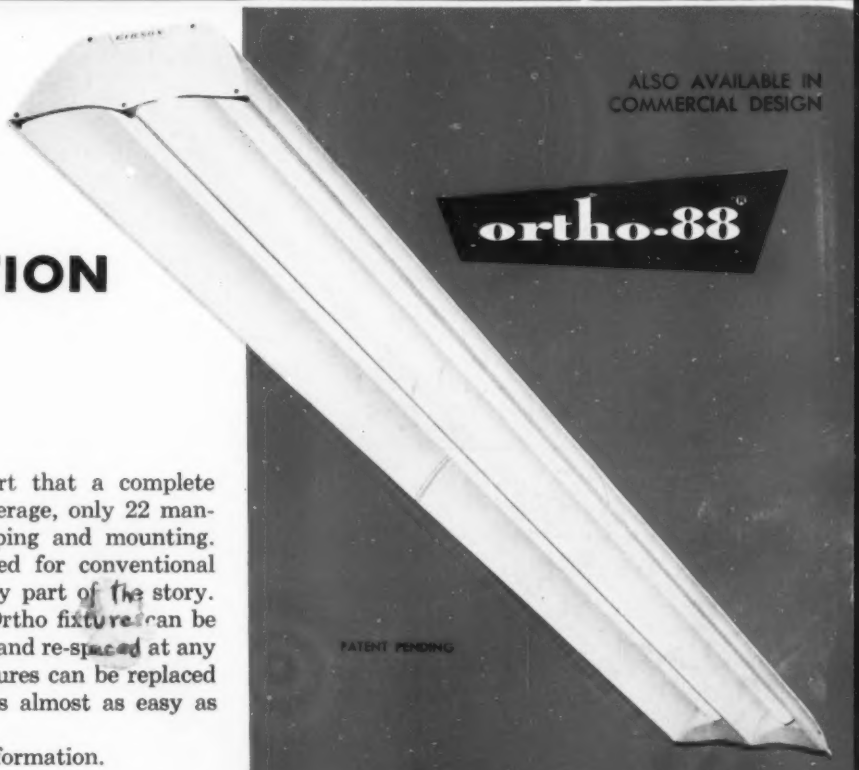

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Volume 37 **Number 10**

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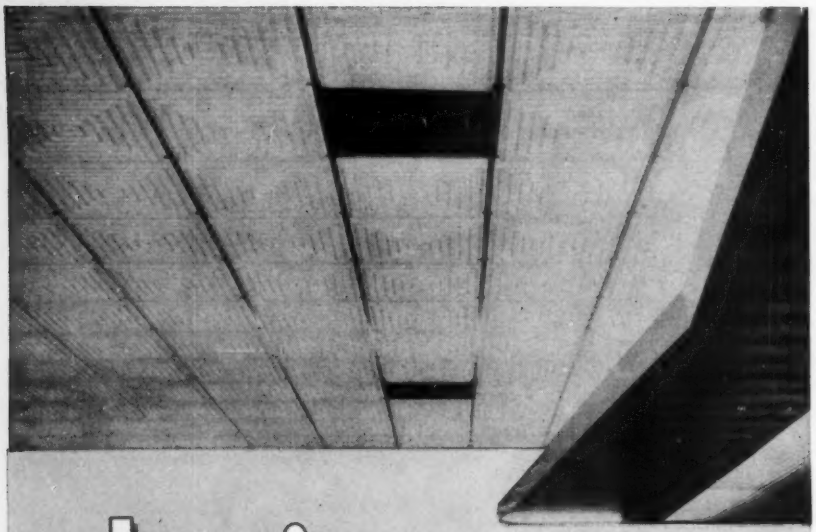

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SERVING THE 18 SOUTHERN AND SOUTHWESTERN STATES

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Economic comment

by J. Whitney Bunting, Ph.D.

Contributing Economics Editor

Security prices and the new investor

As so often happens during periods of stock price prosperity, the market is filled with thousands of new investors. Both the New York and the American Stock Exchanges report more investors than ever before—many with just a few shares owned yet forming the basis of a new capitalistic group. It is this small investing group that many industries look to to provide the flow of new money so essential to the growth and development of the American economy.

Most financial houses, and the exchanges themselves, have tried to interest the small investor to enter the stock field. Over the past decade or so it has been quite easy to prove that by the purchase of this security or that, a person's investment might soar to many times its original worth in terms of dollar value.

Furthermore, with very few periods of falling stock prices or readjustments, as they are sometimes called, most of these people with somewhat limited financial resources have seen continuous opportunity for the expansion of their savings through the investment process. Thus, the great present groundswell of new security buyers.

Although anyone who has observed the movements of stock prices even during small recessions knows that stock values can move upward or downward, the history of the market in recent years has limited consideration of potential downturns by many small investors. They have believed that continued price increases were the order of the day. Consequently, the recent erratic behavior of the market has caused much concern and some security selling because of a lack of understanding of the economic premises involved in this behavior.

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

Some simple rules

Many competent financial observers now believe that a system of better education for the small investor is needed. Some form of conditioning to prepare the investor for possible stock price downturns as well as for the continuation of rising values is necessary.

When the small investor enters the market, he must first of all recognize his personal lack of knowledge of financial affairs. This is no time to walk alone and expect to remain unscathed. Several rules, then, become immediately apparent.

First, the investor should have a definite plan or program with an anticipated end result in view. Thus, he should know whether he buys for growth, for income, or for speculation. In most cases the latter should be ruled out for this class of investor.

Second, a competent financial advisor is almost essential particularly during the early years when the investor is building his security portfolio. The wise counsel of a man who spends his life in the analysis of security trends and movements can protect the novice from making many serious errors that are caused by ignorance of market fundamentals.

Some years ago investment bankers were not too interested in the small security buyer. Now, with industry clamoring for new funds and with heavy income tax rates upon the large investors, the small purchaser has far greater significance and thus receives favorable consideration.

Third, the small investor should not expect continuous price rises in the securities he holds. Based upon past experience, this situation is just not realistic. There will always be periods of downturns just as there will be periods of recovery. Confidence in the market should not be lost because of a downturn. If the securities were purchased with a view to safety, they should not be "quick-sold" just because of a dip in market price.

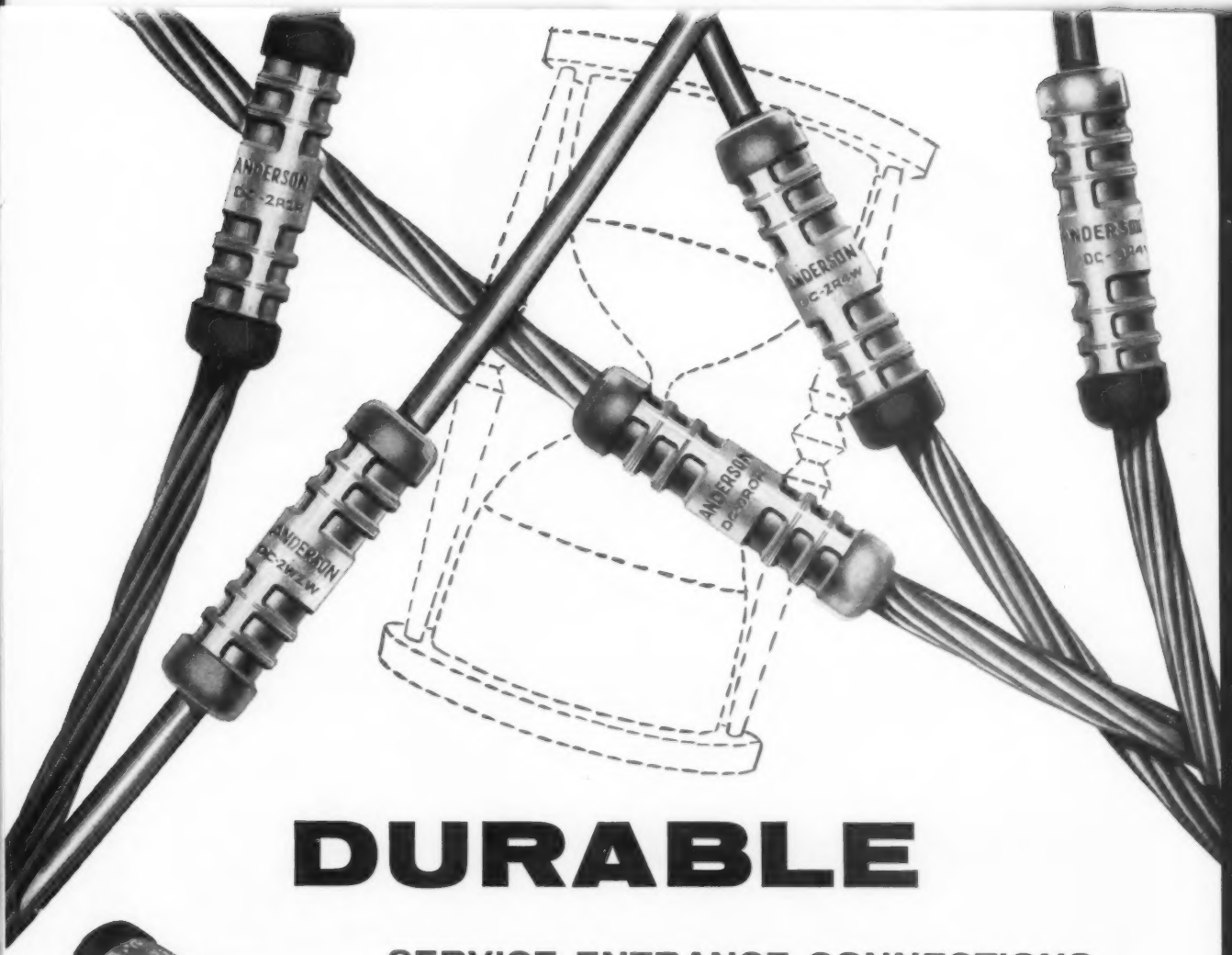
In order to overcome the ups and downs of market prices, many brokers and dealers recommend that the small investor buy regularly in order to balance out over the years the fluctuation of the market. In this manner his portfolio will then have some issues bought at low prices and some at high. On the average, however, he will fare rather well with good stocks in an economy of advancement such as America's.

A final rule is never to place more money in the market than one can afford. For example, a household emergency might require liquidation of holdings at a most inopportune price time if all money were invested in securities. All investors, but particularly the small ones, should maintain a sufficiently large savings account to care for emergencies.

Usually this amount of savings should be equal to six months earnings although this can be varied to meet personal conditions. It should be recognized that United States Savings Bonds are classified as savings since they are exchangeable for cash with no price loss. If this principle is followed, stocks need not be sold when the market is depressed or when a considerable loss in money would be the result.

The basic premise for the new

(Continued on page 131)



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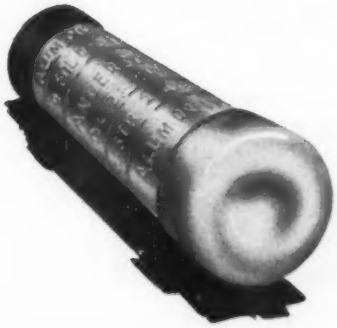

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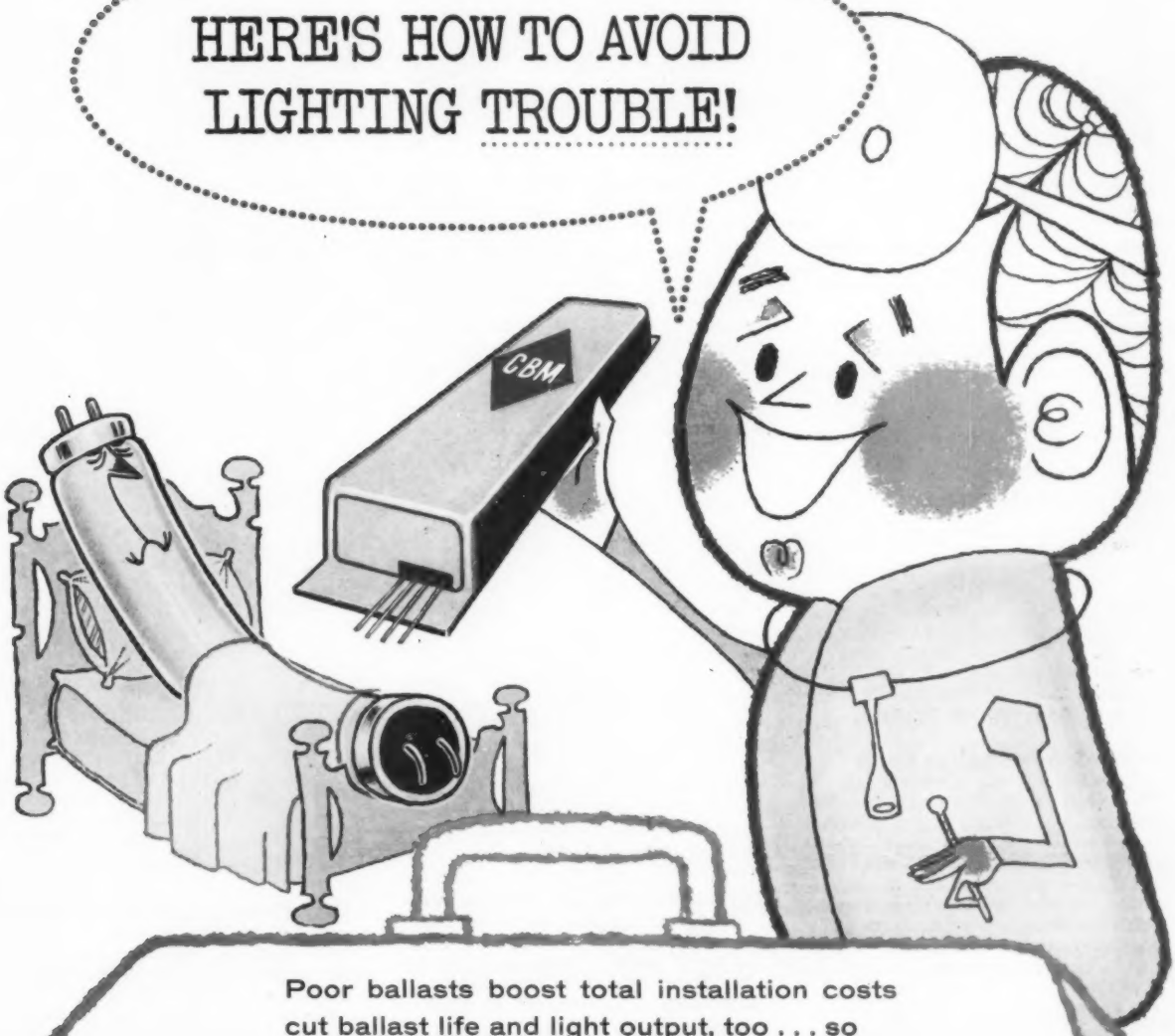

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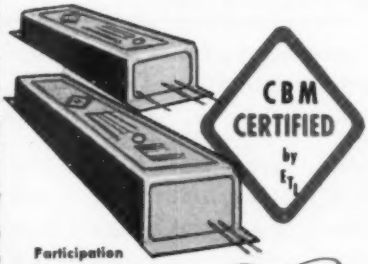

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1086—Cable Connectors
Tomic Sales and Engineering Co., 4864 Woodward Ave., Detroit 1, Mich., now have available catalog sheets containing data on the complete line of their connectors, couplings, and cable connectors.

1088—Fittings and Fixtures
A 32-page illustrated catalog covering Killark fittings and fixtures is offered by Killark Electric Mfg Co., Vandeventer and Easton Aves., St. Louis 13, Mo.

1092—Electrical Boxes
Steel City Electric Co., 1207 Columbus Ave., Pittsburgh 12, Pa., offers a catalog of their complete line.

1130—Conduit Fittings
The latest completely illustrative catalog on their diversified line of conduit fittings is announced by the Atlantic Conduit Fittings Co., 450 Western Ave., Boston 35, Mass.

1136—Space Heating Guide
Cavalier Corp., Chattanooga 2, Tenn., has prepared a Guide for Calculations on Electric Space Heating. It is based on study of several thousand installations of electric heat and is a handy reference for calculating electric heating requirements and estimating operating costs. The booklet contains discussion, charts, and floor plan examples.

1150—Fluorescent Fixtures
A ninety-six page catalog, "Engineered Lighting," is being offered by Wm. Penn, 1429 South 23rd St., Philadelphia 46, Pa. Specifications and applications are described for interior illumination from 10 to 750 foot candle levels.

1166—Electrical Fittings
A 40-page illustrated catalog and price list on the Gedney line. Shown and listed are conduit, threaded entrance, SEC, EMT and ground fittings, and box connectors for both armored and non-metallic cables. Copies are available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N. Y.

1184—Approved RHW Wire
Bulletin No. 1018 describing first Underwriters' Approved Type RHW Wire, developed to meet the new National Electrical Code standards, is available from Simplex Wire and Cable Co., 79 Sidney St., Cambridge 39, Mass.

1190—Electrical Fittings
Blackhawk Industries, Dubuque, Iowa, offers a complete catalog of electrical conduit and cable fittings. Also a special publication giving detail drawings and instructions for installing service entrance masts on low or ranch type buildings.

1192—Wire Pulling Lubricant
Illustrated six-page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Co., 3812 150th St., Cleveland 11, Ohio.

1214—General Catalog
General catalog of Royal Electric Corporation, Pawtucket, R. I. covering flexible, service and lamp cords, cord sets, extensions, trouble lights, wiring devices and fuses is available to wholesalers. Dealer catalogs may be secured from Royal distributors.

1218—Carbon Products
A 28-page catalog on Motor and Generator Brushes and carbon products telling how to order brushes, grade recommendations, characteristics, and description of brush grades, is available from the Helwig Co., 2536 North 30th St., Milwaukee, Wis.

1220—Stadium Lighting
The Pyle-National Co., 1334 N. Kostner Ave., Chicago, Ill., announces the availability of a new eight-page bulletin, No. 605, on stadium lighting, describing in detail floodlighting of a typical outdoor athletic arena stressing the importance of using fully enclosed floodlights.

1224—Electrical Equipment
The Wadsworth Electric Mfg. Co., Inc., Covington, Ky., has issued a new catalog Con 15-0 and Bulletin W. C. B. 53-1, containing data on their lines of Safety Switches, Service Equipment, Distribution Panels and "E-Z-RED" Circuit Breakers.

1230—Compression Connectors
An illustrated 18-page bulletin (13A) describes Squeezon compression connectors for all overhead distribution connections from line wire to ground rod. Offered by James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo., the bulletin also describes the mechanical and hydraulic installation tools required and tells where to use each.

ELECTRICAL SOUTH
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October, 1957

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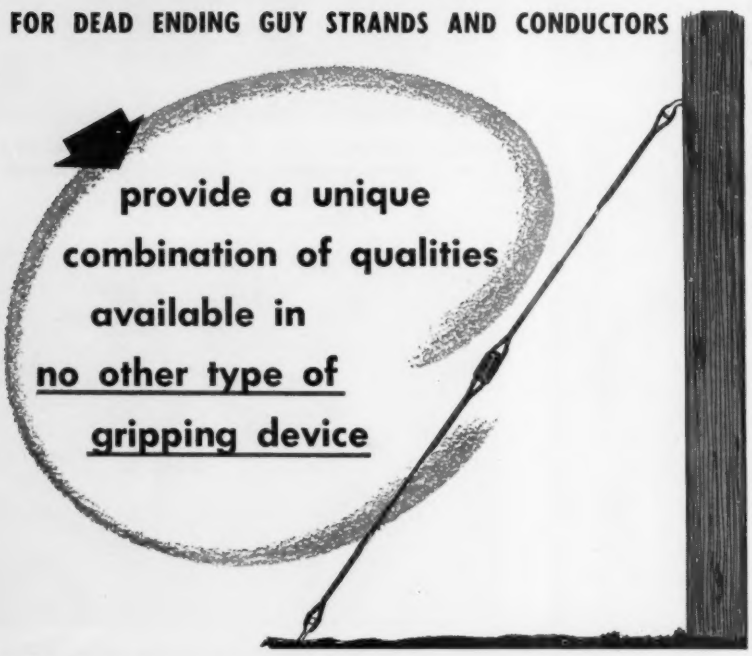

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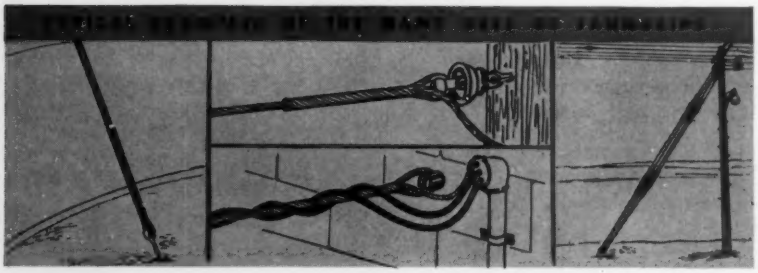
- Do not damage surface of strands.
- Neat application without bulk — no dangerous or wasteful ends.
- Available in electro galvanized steel, copperweld or aluminum alloy.

No other dead-ending method matches FANNGRIPS economy!

WRITE FOR CATALOG



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THE FANNER MANUFACTURING COMPANY

Electrical Products Division

BROOKSIDE PARK • *Established 1894* • CLEVELAND 9, OHIO

Telephone: SHadyside 1-6000

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ARMOR RODS • LINEGUARDS • TAP ARMOR
PATCH RODS • FANNGRIPS • PLASTIC FANNGUARDS
PLASTIC INSULATING TUBINGS AND MOLDINGS

Enter Code Numbers of Catalogs Desired on Coupon on Page 8

1238—Selecting Fuses

A 12-page descriptive handbook "Fuseology" tells how to get safest most dependable, trouble-free electrical protection from fuses. Contains useful information on selecting right size and type of fuses—how to stop needless blows—avoiding poor contact and other troubles. Issued by Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo.

1240—Lighting Fixtures

Prescolite Manufacturing Corp., 2229 Fourth St., Berkeley 10, Calif., now has available a 20 page color catalog, No. 31-F, describing their complete line of lighting fixtures including recessed series and accessories, surface series and accessories, exit light, and aisle lights. A typical installation and dimensional drawing are shown for each fixture.

1244—New Electrical Fittings Catalog

Concise 36-page catalog illustrates and describes a complete line of electrical fittings, cable racks and wiring specialties. The catalog contains many detail drawings, clear-cut photographic illustrations of mast fittings, cable connectors, straps, hangers and ground clamps in a wide variety of types and sizes. For your free copy, write The M. & W. Electric Mfg. Co., East Palestine, Ohio.

1248—Conductor Armor

A new catalog of Superformed Armor Rods, Lineguards, Patch Rods, and Tap Armor describing various uses and applications of these products on overhead conductors is offered by The Fanner Manufacturing Company, Brookside Park, Cleveland 9, Ohio.

1250—Electrical Enclosures

Catalog No. 5354 currently being offered to the trade by B & C Metal Stamping Co., 590 Means St., N. W., Atlanta, Ga., is a well-organized, 66-page manual giving complete descriptive information, prices, and specifications on all items in the B & C line of electrical enclosures. Copies are available free of charge to electrical contractors.

1254—Construction Anchors

"Anchoring for Power and Communication Lines," a completely illustrated manual on improving line construction with better anchoring, has been published by the Advertising Dept., the A. B. Chance Co., Centralia, Mo. The 25-page booklet shows how to install the right anchor at the right place in the right way.

1262—Fluorescent Fixtures

The new loose-leaf catalog recently issued by Southern Lighting Manufacturing Co., 501 Elwell St., Orlando, Fla., contains complete diagrams, specifications, and descriptions for all fluorescent fixtures which they manufacture. In addition to the information on commercial, industrial and school fixtures, the catalog also lists hangers, troffers, troffer accessories, and incandescents which are available from the firm.

Enter Code Numbers of Catalogs Desired on Coupon on Page 8

APPLETON "AA-51" SERIES VENTED EXPLOSION-PROOF LIGHTING FIXTURES

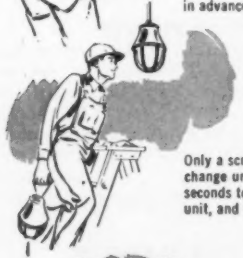
Close-up showing canopy, extra-safe multiple "AA-51" contact threads, and anti-vibration guard with V-shaped metal prong before engaging canopy notches.

Canopy is securely locked against vibration disturbance by positive engagement of V-shaped metal prong in tightly sealed canopy notch. This anti-vibration guard may be quickly released by hand pressure for maintenance.

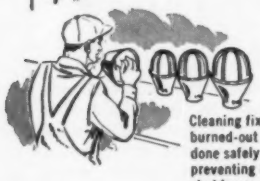
Similar in action to canopy guard, this close-up shows anti-vibration guard locking globe ring to dome unit assembly. Metal prong in dome unit is securely engaged by notched globe ring to prevent accidental loosening. This anti-vibration guard also may be quickly released by hand pressure for maintenance.

58 Second Relamping

Series "AA-51" stand-by units are ready at an instant's notice for relamping... with handles attached in advance.



Only a screwdriver is needed to change units . . . and only 58 seconds to climb ladder, change unit, and descend.



Cleaning fixtures, changing burned-out lamps, can be done safely at bench . . . preventing costly shutdowns.

The fixture with "all" the features now sets even greater standards of efficiency and safety!

APPLETON'S new anti-vibration guard on all "AA-51" vented explosion-proof fixtures assures users of positive protection against spark caused mishaps due to vibration conditions. Coupled with multi-thread safety design where a "flame-tight" contact chamber permits servicing *even with the current on*, this new anti-vibration guard demonstrates APPLETON'S continuing quality research program to bring you the finest in electrical products. Check these other features for proof of "AA-51" design leadership and adaptability for your requirements. Write for complete information today.

Sold through franchised wholesalers only

"Full Circle Venting"
Porous metal interior and specially designed hood dissipate heat evenly and safely . . . keep fixture temperature down, provide longer lamp life.

APPLETON ELECTRIC COMPANY
1754 Wellington Avenue, Chicago 13, Illinois

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Automatic Reclites

"ST" Series Connectors

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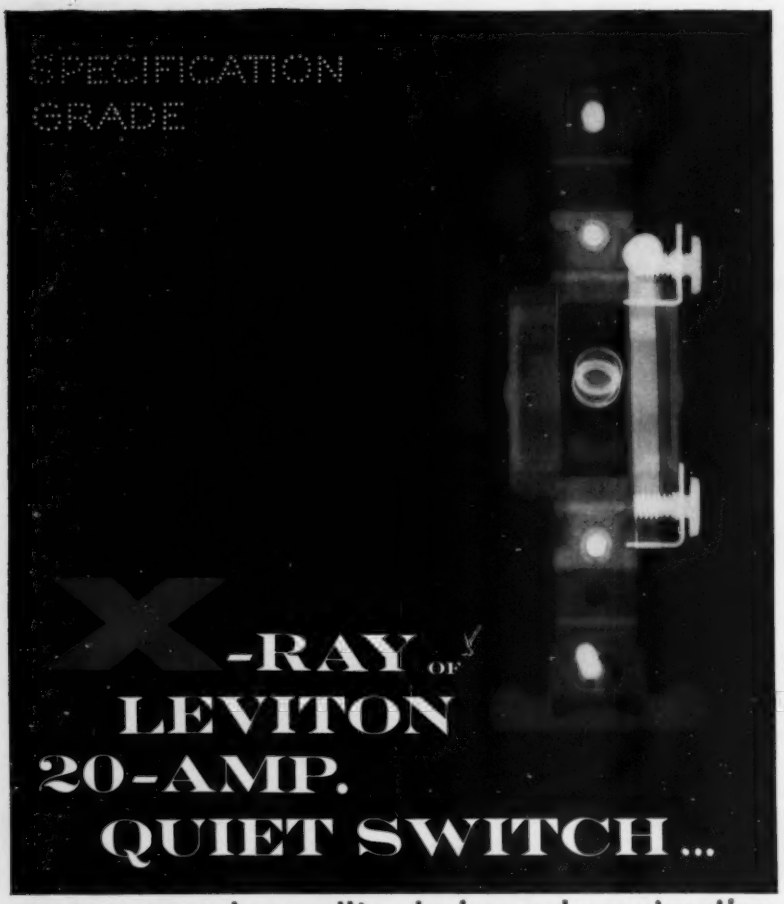
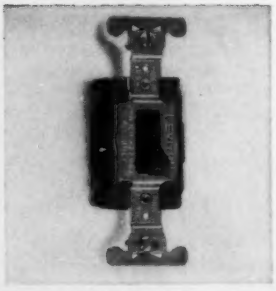


exposes superior quality, design and construction



Ratings: 20 A. — 120-277 V. Single pole, double pole and 3-way, AC only. Also available in 15 Amp. single pole and 3-way. Listed by UL, CSA and meets Federal specifications.

What you don't see counts, too! Leviton rigid quality controls assure you of specification grade 20 amp. heavy duty quiet switches that outperform your most demanding requirements. Compare this new Leviton switch on any basis you desire. You'll be convinced that grade for grade, performance for performance, Leviton superior quality stands out. Look at these special features . . .

Versatile — Fully enclosed flush tumbler switch . . . operates *in any position.*

Durable — Will withstand high inductive loads of fluorescent systems, and take full rated capacity of tungsten filament lamp loads . . . Takes full load currents up to 80% of the switch ratings for motor control.

Long-Lasting — Heavy gauge steel plaster ear straps riveted to housing, thereby providing a permanent assembly. 20-Amp. Quiet Switches will outlast ordinary 20-Amp. switches due to simpler, more durable construction.

Reliable — New design includes a magnetic arc-snuffing action at the fine silver contact points, assuring years of extra service.

Easy to Install — Large head brass terminal screws accommodate No. 10 conductor. Comes with mounting screws inserted in strap.

Quick Identification — Red body cover for easy identification.

Write today on your letterhead for free sample.

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LEVITON

For Best Results Use Wire By American Insulated Wire Corporation

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1300—Lighting Control Switch

The Arrow-Hart and Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn., offers a one page information sheet on their new quiet, tap action, lighting control switch, designed to fit any standard toggle wall plate.

1302—F. Lamp Maintenance

An informative folder on Fluorescent Lamp Trouble Shooting is offered by Champion Lamp Works, Lynn, Mass. It features an illustrated trouble shooting check chart. The Champion Lamp Works also has available a helpful slide rule on lamp application, covering incandescent, regular fluorescent, and slimline lamps.

1304—Portable Trench Digger

Stampings Inc., 1017 Mound St., Davenport, Iowa, offers a four page information sheet about the Pow-R-Spade portable trench digger. It was designed to be controlled and handled by one man and digs a neat three-inch wide trench to any depth up to 24 inches.

1306—Fasco Fans

Fasco Industries, Inc., North Union and Augusta Sts., Rochester 2, N. Y., offers a thirty page catalog describing their line of window fans, oscillating fans, hassock fans, kitchen ventilating fans, and range hoods.

1308—Cable Spinners

A complete data file on aerial cable spinners and tools is available from Cable Spinning Equipment Co., 3100 Topeka Blvd., Topeka, Kansas. The file includes reprints of pertinent articles, operating instruction book, and price list.

1310—Vinyl Plastic Tapes

Three booklets just issued describe Dutch Brand vinyl plastic tapes available for a variety of applications. Plastic tapes in colors, pressure sensitive strapping tape, and Trantex Tape designed especially for protection against corrosion are among those manufactured by Dutch Brand Division, Johns-Manville, 7800 So. Woodlawn Ave., Chicago 19, Ill.

1312—Killark Fittings

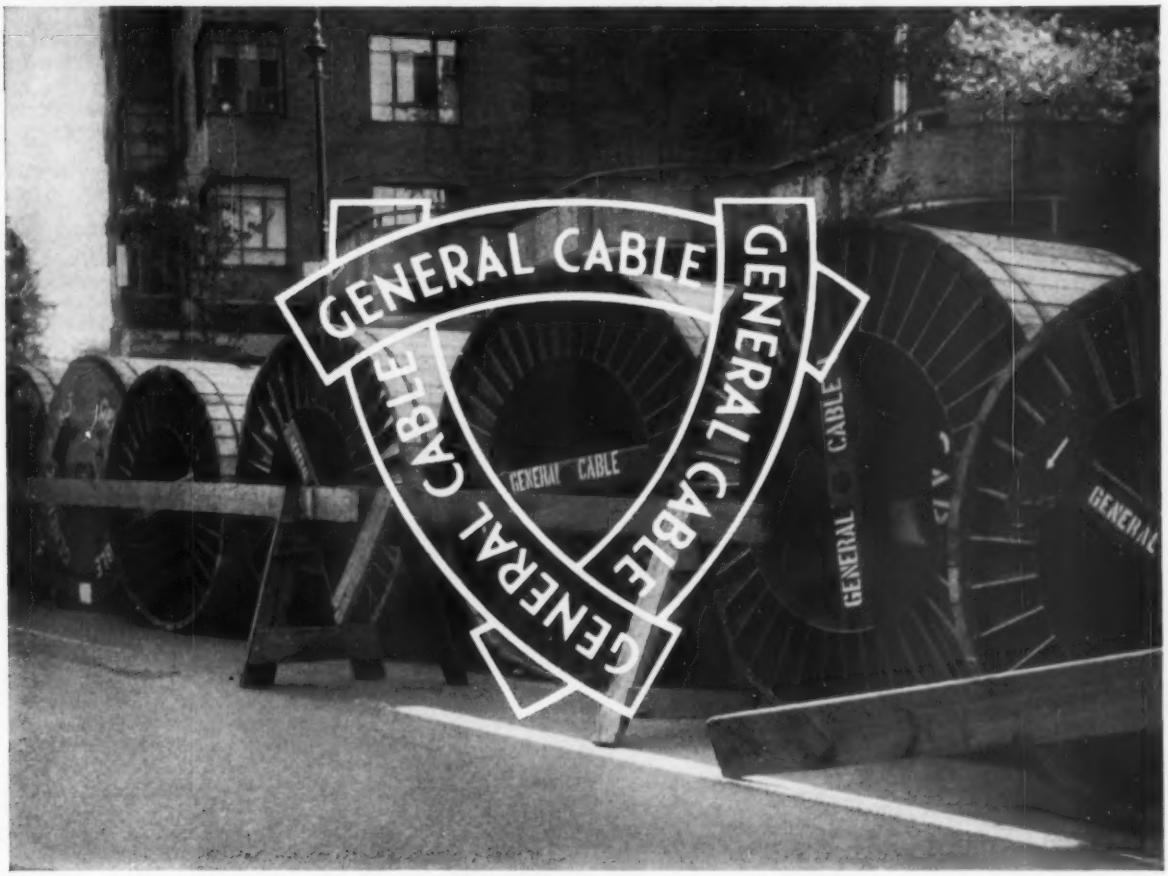
A new catalog section covers Killark plugs and receptacles in two basic designs: explosion-proof and weatherproof. This new line offers many advantageous features, and is available in many styles and sizes to fit various boxes. Killark Electric Mfg. Co., Easton and Vandeventer Ave., St. Louis, Mo.

1314—Wiring Equipment

Keystone Manufacturing Co., 23328 Sherwood Road, Center Line, Mich., has issued a new catalog (No. 157-A) giving complete specifications and illustrations on their line of wiring installation equipment. Included in the 70 page catalog are wireway and auxiliary fittings, cutout boxes, outlet boxes, switch boxes, and cabinets, giving Code requirements, and price sheets.

Enter Code Numbers of Catalogs Desired on Coupon on Page 8

GENERAL CABLE BACKS YOU UP



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AVAILABILITY: Immediate delivery everywhere, through over 500 Authorized Distributors, backed up by complete inventories of wire and cable in all the General Cable Distributing Centers.

SERVICE: Experienced and trained representatives and engineers to help you on the job.

QUALITY: General Cable quality, made in 21 modern manufacturing units to rigid General Cable standards. Quality inspection from raw materials to final packaging.

General Cable backs you up on the job with the *three things you need* to make it easier for you and to keep your jobs on schedule . . . the finest service anywhere.

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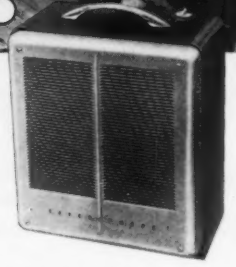
PORTABLE HEATERS



Model	Cat. No.	Volts	Suggested Price
PA-32	3995-S	240	$74.95
PA-36	3995-T	208	79.95
PA-48	3995-U	240	79.95

New DESIGN
Modern Streamlined

New COLOR
Tutone Driftwood

New CAPACITIES
3200, 3600, 4800 watts

100% SAFE!

The reason these heaters are so safe to use anywhere from attic to basement is because of the completely sealed-in, cast-aluminum heating element—an Electromode exclusive feature. There are no open wires and no glowing coils, and there is no danger of fire, shock or burn. Equipped with an automatic safety switch and quiet heavy duty motor.

INSTANT HEAT—WHEREVER NEEDED

These powerful new heaters give abundant fan-circulated heat for big rooms, safely and quickly. Enable the family to use the whole house, anytime. Equipped with a 6-foot cord and plug and convenient carrying handle. Built-in thermostat provides automatic room temperature control.

Ideal for use in basement game room, work shop, laundry; expansion attic; cottage; garage; big hard-to-heat rooms.

Electromode's full line consists of heaters for home, farm, industry—in portable, suspension, and wall-type models.

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1266—Metal-Clad Switchgear

Detailed information on metal-clad switchgear is now available in two special bulletins, 700-B and 7004-C. These booklets give descriptions, application data and specifications on units up to 15 kv and 500,000 kva interrupting capacity. Wire I-T-E Circuit Breaker Co., 19th and Hamilton St., Philadelphia 30, Pa.

1268—Lighting Fixtures

The Perfeclite Co., 1457 East 40th Street, Cleveland 3, Ohio, makes available the following literature: (1) Data Folder 54-B—4 pages of engineering information, prices and specifications on Plastic Indirect Concentric Ring Luminaires. (2) Data Folder EX-55-A—10 pages of information on Exit Units for all building locations. Complete engineering data and prices given. (3) Data Folder 56-A—information on Ceiling Pan Fixtures and Vapor Proof Prismatic Exterior Fixtures.

1280—Electric Heating

Electromode Division of Commercial Controls Corp., 45 Crouch St., Rochester, N. Y., has issued a new catalog listing their complete line of electric heaters, including bathroom, wall-type, portable, baseboard heating, radiant heating panels, various industrial units, and combinations. Also included in Catalog No. 31-K-3 are complete specifications and price list.

1282—Exit Lights

A four-page catalog providing illustrations and specifications for their complete line of exit lights has been released by Curtis Lighting Co., 6135 W. 65th St., Chicago 38, Ill. Types of mountings illustrated include recessed, end to wall, ceiling, direct wall, and pendant.

1284—Electric Radiant Heating

The design and installation of electric radiant heating is covered comprehensively in two publications just released by General Electric Co., 95 Hathaway St., Providence 7, R. I. Designers of heating systems will find valuable information in a 24-page Electric Radiant Heating Design Manual. A 36-page manual explains and illustrates how to install G-E Electric Radiant Heating in homes.

1288—Electric Ventilators

An illustrative 8-page folder, Bulletin 620-L, showing typical installations of a complete line of ventilators for wall, ceiling, laundry, bathroom, kitchen, and small rooms, is available from TradeWind Motorfans Inc., 7755 Paramount Blvd., Rivera, Calif.

The folder includes dimensional drawings of installations helpful to building and electrical contractors.

1298—Electrical Fittings

The Electrical Fittings Corp. of Woodside, New York (EFCOR) offers a complete catalog covering all types of fittings for all types of raceways and conductors. The catalog also features an extremely comprehensive "What Goes Into What" section covering 5 pages alone.

these are the manufacturers who offer RLM-labeled units...

1,000 Words of Specifications®

are back of every RLM-labeled industrial lighting unit!

The power of over 1,000 words of highest-in-history RLM lighting specifications is behind every RLM-labeled unit. Each word is in accord with basic, nationally-accepted, minimum standards for industrial lighting equipment efficiency, design and performance. RLM-labeled units conforming to these specifications are available from the leading manufacturers shown in the chart above. While each RLM Unit meets certain minimum RLM Standards, other special features, such as construction refinements or operating advancements, vary from unit to unit according to the ideas and skill of the individual manufacturer. For example, the RLM Label may be affixed to as many as 960 different types of RLM Dome Reflectors! Send for your complimentary copy of the 1957 RLM Specifications Book, containing a complete set of RLM Specifications.

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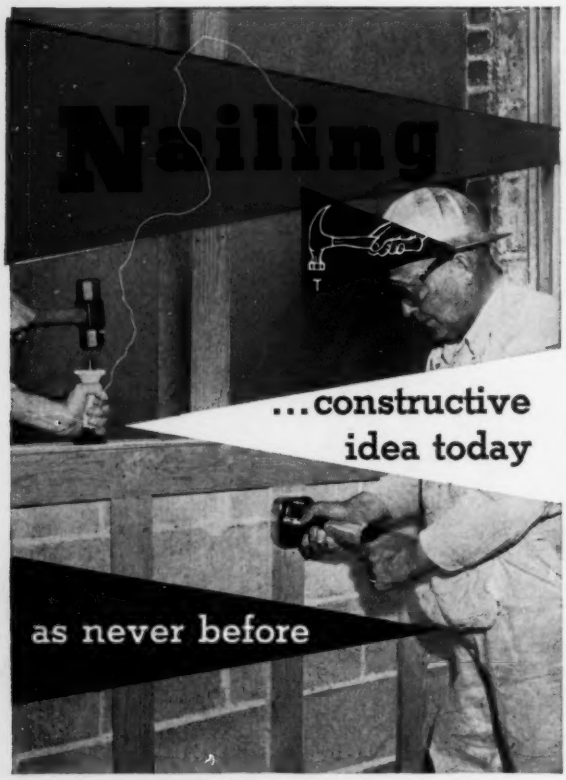
The letters RLM stand for Reflector and Lighting Equipment Manufacturers

R-1553 R

For Creative Lighting... a New Horizon!



Now *OMARK*® enables you to adapt "NAILING" to your steel and concrete fastening jobs

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Powder-Actuated Tools, Drivepins

You'll make solid savings in money, time and effort when you apply the time-tested principles of "nailing" to your steel and concrete fastening jobs with OMARK Drive-It and Drivepins. Thousands of builders have proved it. Drive-It "nails down" the heavy job.

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Here's maximum steel and concrete "nailing" economy and efficiency with a lightweight hand-and-hammer operated tool. Eliminates tedious drilling, boring; does scores of formerly tough fastening jobs quickly, securely. Hammer-Drive "hammers home" the small job.

For on-the-job counseling and service, see your factory-trained OMARK dealer. His name is listed in the phone book yellow pages under "Tools."

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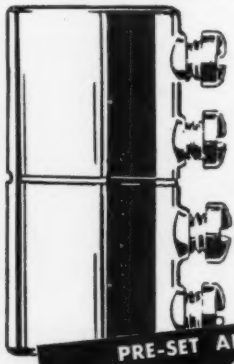
NOW! ETP FITTINGS ARE

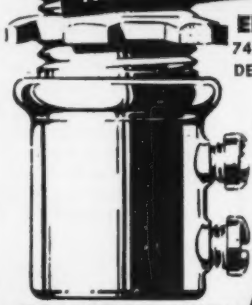
CONCRETE APPROVED (UL)

For safe, quick concrete installations specify ETP UL concrete approved connectors and couplings. Precision, one-piece solid construction cannot spread or split—cannot leak sand or water—cannot rust or corrode conduit.



- One-piece solid tubular steel—heavily plated and sized for uniformity.
- Self-centering box connector shoulders.
- Approved UL File Card #E24788.
- Available in ½", ¾", 1", 1¼" and *NEW* 1½" and 2" sizes.

PRE-SET AND STAKED SCREWS
NO BACKING OUT TO INSERT CONDUIT



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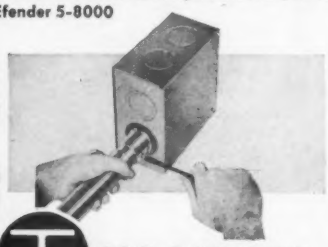
DEfender 5-8000



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For Creative Lighting... a New Horizon!

A new concept in uninterrupted flowing lines of light
for Stores—Offices—and other Commercial areas

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Widens the Creative Horizons of those who Design with Light!

...a new High in

Dynamic, uninterrupted light
the flowing lines of light are unbroken by metal strips, supports or braces. Reinforcing rods are on inside, out of view.

Harmonizing, shallow design
just 3½″ from top to bottom avoids that "bulky look." Slim, trim silhouette harmonizes with any interior.

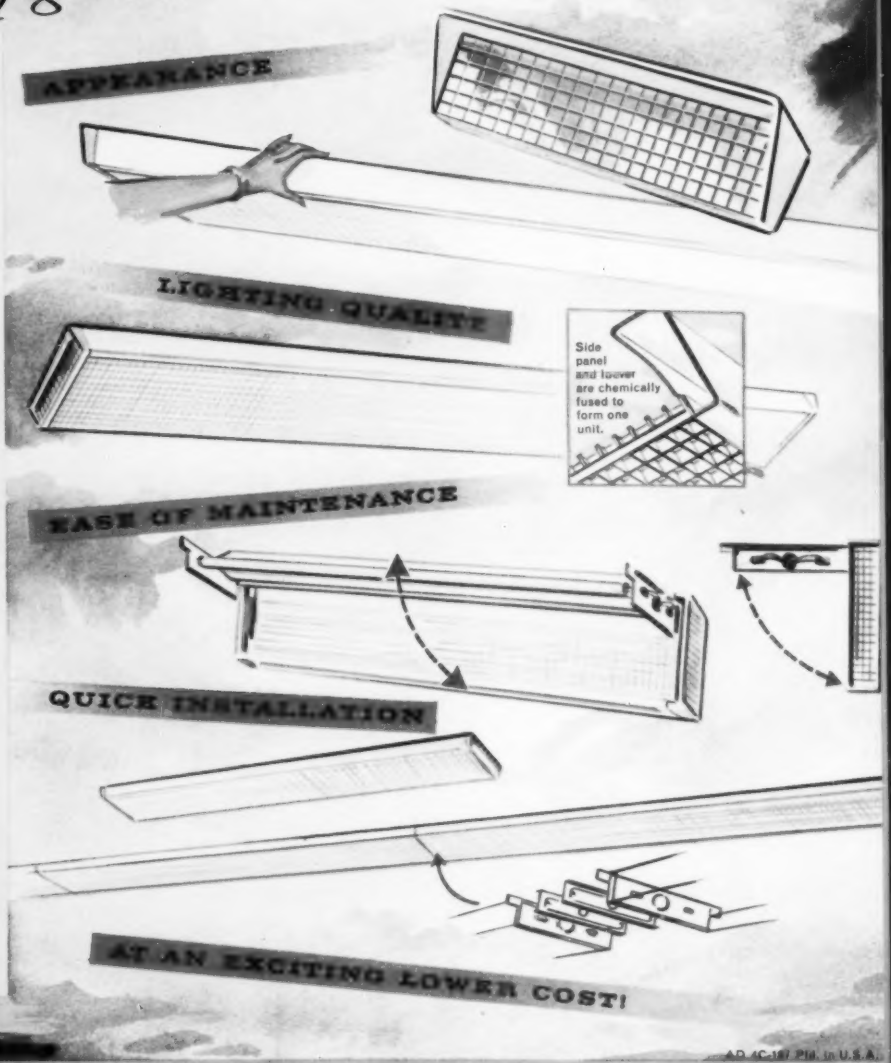
Functional beauty
decorative end caps are of injection-molded plastic with a glistening metallic face.

Exciting lighting quality
with 45° shielding and diffusing side panels plus 55% upward light* for greater seeing comfort. Double-wall side panels effectively control brightness and add strength.

Exceptional ease of maintenance
entire louver and side-panel assembly swings down from either side. Unique thumb-pressure tabs require no tools. Control equipment easily accessible from below by merely removing 2 screws.

Time-conserving installation
simple spacer couplers between fixtures on continuous lines assure positive alignment. Available in 2 and 4 lamp 96″ Slimline, 2 and 4 lamp 40-W Rapid Start and 2 and 4 lamp 40-W Rapid Start in an 8′ tandem unit.

** When ceiling mounted, a top reflector is provided.*


APPEARANCE
LIGHTING QUALITY
Side panel and louver are chemically fused to form one unit.
EASE OF MAINTENANCE
QUICK INSTALLATION
AT AN EXCITING LOWER COST!

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DES PLAINES, ILLINOIS

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always the source of good lighting
Now Setting the Pace in COMMERCIAL LIGHTING

MOLDED CASE CIRCUIT BREAKERS

Magnetic only type ETI circuit breakers have convenient, externally located adjustment controls. Available in F, J, K, KL, L and M frame (3 to 800 amperes continuous ratings), 2 or 3 pole, 600 v a-c, 250 v d-c.

Only I-T-E gives you convenient external trip adjustment

In motor control and resistance welding applications, adjustment of protective devices to a required setting is important. One of the many features of the ETI circuit breaker is its convenient externally adjustable magnetic trip device. When it is required to adjust the trip to a finer degree, adjustment is made from the front of the breaker without interrupting service or encountering live conductors. The range of instantaneous trip adjustment means greater protection for motors and resistance welders. When a short circuit occurs, all poles open simultaneously. And enclosed terminals protect personnel, yet permit easy cable connections. All these extra values in I-T-E molded case circuit breakers are yours at no extra cost. Send for complete information or contact your nearest I-T-E authorized distributor.

I-T-E CIRCUIT BREAKER COMPANY • **Small Air Circuit Breaker Division**

19th & Hamilton Sts., Philadelphia 30, Pa.

IN CANADA: EASTERN POWER DEVICES, LTD.

Footcandle

By J. L. Tugman
Lamp Division
General Electric Company
Cleveland, Ohio

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers ✓
- Consulting Engineers ✓

These two GE lighting specialists share an office with a lighting installation that very closely approximates the ideal condition found under the shade of a tree on a summer day. Actually, their office is a much better proposition because rain or shine, winter or summer, they can have up to 450 footcandles or any lower level. Their everyday choice is 450 footcandles, the top level. On sunny days they pull the blinds in their corner office. They find the lighting system in this air conditioned room much more responsive to their need for comfortable seeing. The system is completely controllable.

Exacting visual requirements of bench assembly of electrical equipment was met here with a combination lighting system supplying 450 footcandles of well-shielded illumination. Ceiling mounted fixtures house eight-foot slimline lamps providing 60 footcandles. High-output rapid start lamps are employed in the eight-foot suspended fixtures to provide 350 footcandles to the work surface and 35 degree shielding.

◆ IT TAKES LIGHT to aid vision. It takes increasingly more light to see clearly enough to have the vision required by Progress.

The vision required of businessmen to realize the Economy of Abundance has received the most distinguished attention.* It is a phase of the American Advanture in Prosperity.

Among the amazing developments the Adventure has brought is the solid business fact that 50,000 private swimming pools will be sold to U. S. families this year. Strikingly, most of these are for families in the South.

Here, too, it was that the big impetus to home air conditioning got such momentum it spread rapidly to the whole country. Likewise, the air conditioned automobile established its market through its initial success in this part of the U.S.A.

Air conditioning's growth speaks for how comfortable we want to feel. Lighting's advances are closely related. They speak for how we wish to *see and feel* in terms of comfort.

*Henry Luce, editor-in-chief of Time, Inc., told the International Congress of Scientific Management Meeting in Paris this summer: "Philosophers and practical men . . . have work to do together. Reverence and Order! Virtue and Vision! Virtue, specifically the virtue required of the business man; Vision, specifically the vision of the Economy of Abundance."—Fortune, August 1957.

of 1000 and 2000 may be provided.

values up--but not in price!

One of the most gratifying facts about keeping pace with Progress, with the light we need for clear vision, is that illumination has not followed the general upward trend in prices. Footcandles are available at *lower cost* than ever before. They are one of the very rare things that are cheaper in a period of rising costs. With this advantage it is readily possible for every home to get the most value out of the new facilities they are buying.

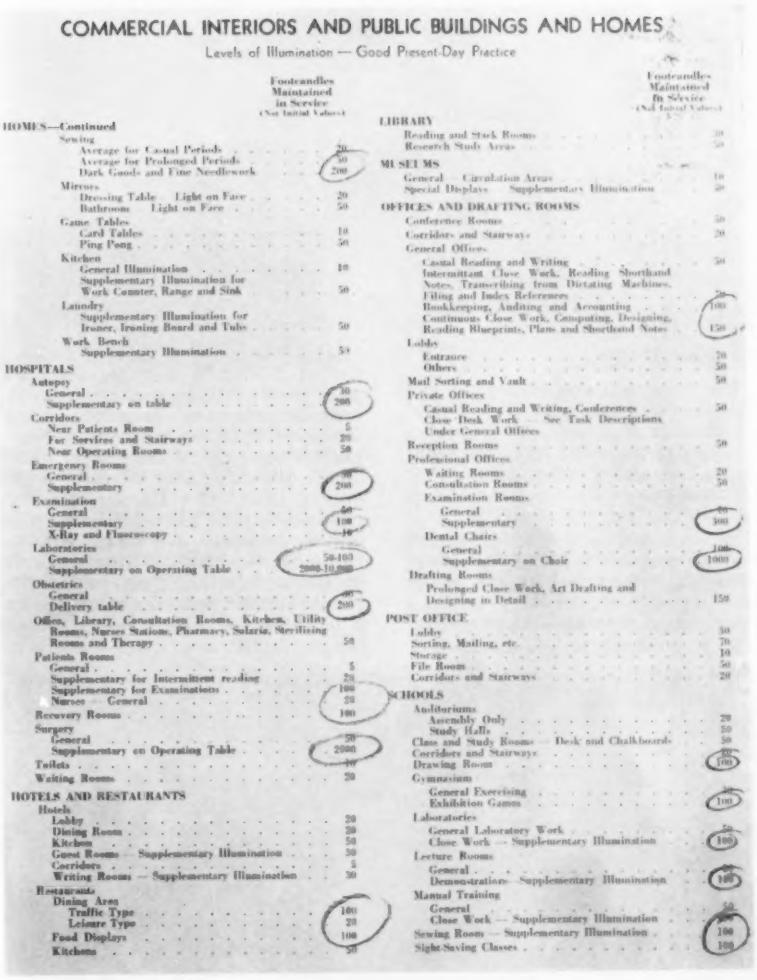
The shop or store that buys an array of new equipment to increase productivity can get the best results *from all of it* by providing the appropriate number of footcandles good design requires. This will correspond to the needs of seeing tasks involved in operating the new equipment at best efficiency.

Aid from engineers

As they have in the past, consumers of lighting have asked and received aid from the engineers who improve the lamps and equipment and the techniques of use. In just five years this cooperation has seen standards of lighting practice virtually leap upwards. Nevertheless, this rather spectacular advance has not been fully appreciated by many people who could apply the benefits of it to their own business or personal enjoyment.

Our new 1957 publication "Footcandles in Modern Lighting Practice" shows, by comparison with the 1952 edition, how markedly recommended levels have advanced. Looking through the tables of specific applications for commerce and industry we find many instances where more than 100 footcandles are advised.

There are assembly lines and inspection operations where 500 footcandles are recommended. This same level appears in the tables for feature displays in self service stores. Show windows and open front retail shops go to 1000 footcandles for special displays. Such levels in stores are employed by day to reduce reflections of sky and buildings. By night they meet competition of neighboring shops.



COMMERCIAL INTERIORS AND PUBLIC BUILDINGS AND HOMES

Levels of Illumination — Good Present-Day Practice

	Footcandles Maintained in Service (Not Initial Values)
HOMES—Continued	
Sewing	
Average for Casual Periods	20
Average for Prolonged Periods	50
Dark Goods and Fine Needlework	200
Mirrors	
Dressing Table — Light on Face	20
Bathroom — Light on Face	50
Game Tables	
Card Tables	10
Ping Pong	50
Kitchen	
General Illumination	10
Supplementary Illumination for Work Counter, Range and Sink	50
Laundry	
Supplementary Illumination for Ironer, Ironing Board and Tubs	50
Work Bench	
Supplementary Illumination	50
HOSPITALS	
Autopsy	
General	50
Supplementary on table	200
Corridors	
Near Patients Room	5
For Services and Stairways	20
Near Operating Rooms	50
Emergency Rooms	
General	50
Supplementary	200
Examination	
General	50
Supplementary	100
X-Ray and Fluoroscopy	10
Laboratories	
General	50-100
Supplementary on Operating Table	2000-10,000
Obstetrics	
General	50
Delivery table	200
Office, Library, Consultation Rooms, Kitchen, Utility Rooms, Nurses Station, Pharmacy, Solaria, Sterilizing Rooms and Therapy	50
Patients Rooms	
General	5
Supplementary for Intermittent reading	20
Supplementary for Examinations	100
Nurses General	20
Recovery Rooms	100
Surgery	
General	50
Supplementary on Operating Table	2000
Toilets	10
Waiting Rooms	20
HOTELS AND RESTAURANTS	
Hotels	
Lobby	20
Dining Room	20
Kitchen	50
Guest Rooms — Supplementary Illumination	30
Corridors	5
Writing Rooms — Supplementary Illumination	30
Restaurants	
Dining Area	
Traffic Type	100
Leisure Type	20
Food Displays	100
Kitchens	50

	Footcandles Maintained in Service (Not Initial Values)
LIBRARY	
Reading and Stack Rooms	30
Research Study Areas	50
MUSEUMS	
General — Circulation Areas	10
Special Displays — Supplementary Illumination	20
OFFICES AND DRAFTING ROOMS	
Conference Rooms	50
Corridors and Stairways	20
General Offices	
Casual Reading and Writing	50
Intermittant Close Work, Reading Shorthand Notes, Transcribing from Dictating Machines, Filing and Index References	70
Bookkeeping, Auditing and Accounting	100
Continuous Close Work, Computing, Designing, Reading Blueprints, Plans and Shorthand Notes	150
Lobby	
Entrance	70
Others	50
Mail Sorting and Vault	50
Private Offices	
Casual Reading and Writing, Conferences	50
Close Desk Work — See Task Descriptions Under General Offices	
Reception Rooms	50
Professional Offices	
Waiting Rooms	20
Consultation Rooms	50
Examination Rooms	
General	50
Supplementary	300
Dental Chairs	
General	100
Supplementary on Chair	1000
Drafting Rooms	
Prolonged Close Work, Art Drafting and Designing in Detail	150
POST OFFICE	
Lobby	30
Sorting, Mailing, etc.	70
Storage	10
File Room	50
Corridors and Stairways	20
SCHOOLS	
Auditoriums	
Assembly Only	20
Study Halls	50
Class and Study Rooms — Desk and Chalkboards	50
Corridors and Stairways	20
Drawing Room	100
Gymnasium	
General Exercising	30
Exhibition Games	100
Laboratories	
General Laboratory Work	70
Close Work — Supplementary Illumination	100
Lecture Rooms	
General	70
Demonstration — Supplementary Illumination	100
Manual Training	
General	50
Close Work — Supplementary Illumination	100
Sewing Room — Supplementary Illumination	100
Sight-Saving Classes	100

This random page from the publication "Footcandles in Modern Lighting Practice" shows how many applications have 100 ft-c or more recommended as the proper level for good present-day lighting practice.

There are specialized tasks where supplementary lighting as high as 2000 footcandles are recommended. In the unfortunate event that might take you to the hospital for an operation, you would want your surgeon to have all the light the job will require. Both he and you will be glad that 10,000 footcandles can be brought to the aid of his sight and your successful operation. For a more prosaic task, like welding, 2000 footcandles is a great help, too. Welders, obligated to use dense filters in their hoods, compensate for the brightness of the arc with 2000 footcandles on the task to guide their hand.

The work world has scores of activities where the success of the job counts very largely on the aid to seing of levels in excess of 100 footcandles of general lighting. For hundreds of tasks requiring supplementary illumination upwards

ment buildings, as well as most

Machine shop

The manufacturing process at this plant involves the lamination of steel or aluminum panels to plywood. Finished panels must leave the plant without scratches, glue deposits, or handling marks. Quality lighting was mandatory. The system is also flexible—a machine shop area today may be an assembly area tomorrow. It was necessary to provide a system which could be altered in layout with a minimum of time and effort to produce a wide range of illumination levels. The problem was solved by use of 2-lamp 8′ fixtures mounted 16½′ from the floor, and connected by cord and plug to an electrical lighting wireway. Fixtures are run in continuous rows on 16′ centers for basic layout. Where greater intensity is required, single 8′ units are installed perpendicular to the continuous rows on 14′ centers. All units provide 30x30 degree shielding. Lighting level in the manufacturing area is 45 footcandles. Estimated hourly cost—1.2¢ a footcandle for each 10,000 square feet.

Laboratory

Work in a quality control laboratory necessitates reading, measuring, and comparing under visual conditions that must promote accuracy and comfort. This laboratory is lighted to a 50-footcandle level by a luminous ceiling of corrugated plastic incorporating continuous rows of 40-watt, 4′ cool white rapid start lamps on 3′ centers. Machine-washable corrugated plastic panels are supported by sound reducing baffles from 5′ to 8′ below the true ceiling. This ceiling was chosen to conceal many structural elements. Because of the diffusing quality of the plastic panels, lamps need not be placed in a regular pattern and can be built around ceiling obstructions. Estimated hourly cost—2.9¢ a footcandle for each 10,000 square feet.

of 1000 and 2000 may be provided. Since we are looking at a printed page we might note that today's recommendations for imposing stones and for proof-reading call for 150 footcandles. The same level is standard for the finishing of photo-engravings which illustrate these pages. Examples from the world of recreation may be higher, although for different reasons.

Your satisfaction with television depends upon studio installations delivering up to 150 footcandles for black and white and 700 for color programs. Your enjoyment of night games of big league baseball is enhanced when the stars have 200 footcandles to spark their performance. Keep in mind that day games have the benefit of as much as 10,000 footcandles.

Footcandle recommendations

Readers of ELECTRICAL SOUTH, who have some experience with lighting practice, may regard the foregoing as different from the everyday values they are more accustomed to seeing. They may wonder just how the new footcandle recommendations apply to the whole array of lighting consumers.

Well, leadership in the effective use of footcandles at 100 and above, as in others, is carried along by the general advance of technology and alertness of keen business men. It is the practical man, weighing alternatives and choosing carefully, but with imagination and courage who demonstrates the advantages of the forward step.

The most impressive advances are not equalled in all fields at the same time. The science and art of lighting progresses significantly at lower levels too. Thus, we see in the tables many values under 50 footcandles. These account for the largest amount of lighted space. The upward trend in these areas is registered steadily, but at a much slower pace.

In many places standards of practice today are still quite modest. For instance, hotel and hospital corridors are up to date at 5 footcandles. If all such areas had the latest recommended values they would evoke more of the cheer these institutions try to convey to their patrons. The well lighted circulation space implies a well kept appearance that chases gloom.

Church and club auditoriums are listed at 10 footcandles. Public space in many offices and govern-

ment buildings, as well as most types of service areas, are meeting present standards at 20 footcandles.

Class rooms and offices meet the schedule at 50 footcandles.

Advanced illumination

It is towards this range of levels that lighting practice generally progresses. The most advanced illumination, done by leaders who elect the peak levels, is the most potent influence on this general movement upward. Business is frequently reminded that it pays to keep up appearances and to look alive and contemporary. Think of the amazing number of new or relighted establishments we see today.

However, this sense of obligation to keep up appearances is always balanced by calculating what benefits improvements will bring. If the advance practice model inspires a competitor to dare 60 per cent of the new value, a second competitor will have the courage to go 80 per cent. In the course of a five year period, the average good application will be where the leader was at the beginning. Where competition is keen, the field must modernize more rapidly.

It is for just such reasons that new buildings must replace old ones that have become obsolete. The ancient, inefficient lighting system, likewise, cannot be continued after other elements of modernization are planned. In fact, it is far better to start any such plans with a relighting scheme that will provide a sound reference for the decoration and furnishing to be done, and the air conditioning that may be contemplated.

Planning begun this way will make evident the advantages of higher illumination values. With them as the basic reference the whole project will be better correlated in all facilities. The result is much more likely to be more productive and more satisfying.

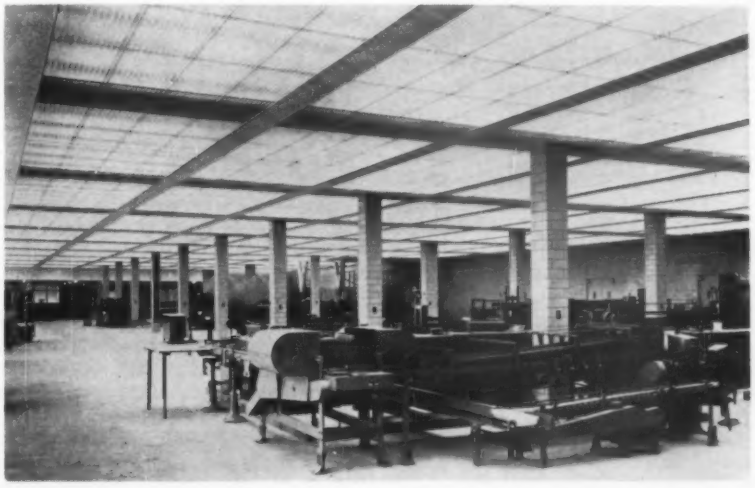
In offering this opinion commercial applications come to mind first. Stores and offices are strongly affected by appearances, and nothing helps so much to make employees and customers respond to appearances as well designed lighting. A great many self service store operations are based upon the efficacy of the lighting plan.

Today, the same reasons why advanced lighting works so much

(Continued on page 130)

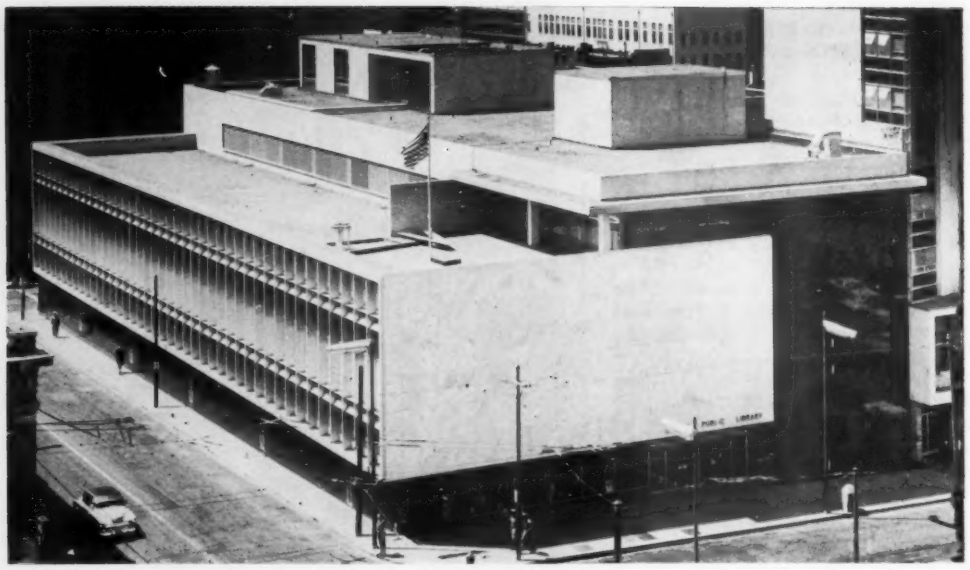
Fabricating shop

Comfort and low maintenance costs were the requirements of the lighting system in this mounting area. H 400 RC-1 mercury lamps were installed in open top, deep-bowl fixtures. 35 degree shielding of the lamp bulb is obtained with 18% upward light. These features plus the white ceilings combine to provide a lighting system which has a visual comfort rivaling that of fluorescent lighting installations. Maintained lighting level is 35 footcandles. Fixtures are spaced on 20′ centers and mounted 28′ above floor. Maintenance costs are low because dirt collection on the sides of these reflector-type lamps has less effect on light output than it has on standard filament or mercury lamps. Color improvement of the light from these lamps is an additional advantage of this installation. Estimated hourly cost—9.1¢ a footcandle for each 10,000 square feet.



Packaging plant

This louverall ceiling installation uses 96″ T12 slimline lamps on 32″ centers. Shielding is 45x45 degrees. The maintained illumination level is 50 footcandles at 2½ watts per square foot. This louverall system provides uniform, well-shielded illumination over the entire-work area. Such an installation leads to reduced employee eye strain and fatigue as well as increased production and improved workmanship. Good maintenance characteristics were incorporated in this lighting system. The lower sections are hinged and can be completely removed for cleaning. They are washed in a portable tank. Group replacement of lamps further reduces maintenance costs and improves appearance. Estimated hourly cost—3.3¢ a footcandle for each 10,000 square feet.



Dallas library meets tomorrow's

Flexible heating, air-conditioning and lighting systems designed to meet changing requirements of the future are incorporated in the new six-story public library located in downtown Dallas, Texas.

By Al Kagler

Electrical Engineer
George L. Dahl, Architects
and Engineers, Dallas, Tex.

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors ✔
- Industrial Engineers ✔
- Consulting Engineers ✔

◆ RECOGNIZING that it had far outstripped minimum recommended requirements for library facilities in a city of its size, the City of Dallas commissioned George L. Dahl, Architects and Engineers to design a new $2,400,000 building. Today the citizens of Dallas are taking advantage of the ultimate in library service in a modern library.

The new library is erected on the site of the old library which was given to the city in 1900 by Andrew Carnegie. It is a six-story, all-welded steel building which fronts 100 feet on Commerce street, 200 feet on Harwood street and 150 feet on Jackson street. It is designed for 800,000 volumes whereas, the old library contained only 250,000 volumes.

The design philosophy incorporated recommendations of most leading librarians, namely: keep the main floor at sidewalk level, with no steps to climb; provide a great amount of sidewalk display space; provide flexible heating, air conditioning and electrical systems to meet the future changing requirements.

Special fixtures used

In general, the new facilities include two basement stack levels, main street floor, mezzanine, second floor and third floor. The lighting and air conditioning systems in many cases were designed into the structural system.

The main reading room on the street level is 200 feet long by 36 feet wide by 18 feet high with an overlooking mezzanine. The lighting of the reading room was designed for 50 footcandles maintained, using a special surface-mounted fluorescent fixture arranged in a grid system.

This pattern was selected to offset the long, narrow effect of the room and to permit the fixtures to be attached to the bottom of the beams. Thus the fixtures were made the same width of the beams and were equipped with hinged, Albalight diffusers.

The air conditioning outlets were placed in the center of squares that were formed by the lights. The finished ceiling is very attractive and functional.

Lighting above and below the mezzanine floors is accomplished with special seven-foot square fluorescent units which were built into the structural system. A seven-foot square plaster recess is provided between the beams and six-foot slimline strips are mounted on the top. The diffusers consist of two three-foot, six-inch by seven-foot metal louvers with 45 degree shielding. These diffusers are equipped with rollers to provide for ease of maintenance.

Cove lighting accentuates reeded wood paneling in a small auditorium located at basement level. At right, the 200' x 36' reading room was designed for 50 footcandles maintained. Lighting above and below the mezzanine floors is accomplished with seven-foot square surface-mounted fluorescents set into grid system housing air-conditioning outlets.

needs

The air conditioning supply discharges into these soffits and down through the open louvers. This area is used for card files; book stack, and reference work, and is designed for 30 footcandles maintained. A large microfilm reference facility is also on the mezzanine floor.

On the second floor is the children's department, which is closed off for sound isolation. The lighting intensity in this department is designed for 50 footcandles maintained, using continuous rows of recessed fluorescent troffers with Albalight diffusers.

Also on the second floor are the audio-visual department, a small viewing room, and facilities for reproducing maps, charts or other materials. The audio-visual department is equipped with soundproofed booths for playing phonograph records, and film check-out facilities.

The small viewing room is used for special occasions such as previews of new films, staff education, and children's movies. The reproducing facilities are to provide copies of materials which library patrons may desire, thus helping to prolong the lives of books.

The third floor is primarily for administration offices, reference department and staff lounge, except that the front of the third floor has a large exhibit reading room. This exhibit room is in the form of a lounge and opens on to a terraced roof garden. The lounge is lighted for 20 footcandles, using recessed incandescent fixtures. It is provided with an underfloor duct system to light various displays.

The offices are lighted for 50 footcandles maintained, using recessed rows of fluorescents. Also the office areas are provided with a two-duct, underfloor system to permit installation of telephone and convenience outlets.

At basement level is a small auditorium which seats 200. This room is paneled with reeded wood and is lighted with cove lights to accentuate the paneling. The room is acoustically treated, has a projection booth, raised stage, and sloping floor. Adjacent to the auditorium are two meeting rooms lighted with fluorescent troffers for 30 footcandles.

On the ground floor is the periodical reading room which is equipped with lounge type furniture. It is illuminated to 30 footcandles with recessed fluorescent fixtures.

Other features of the library include: a drive-up book return, electronic controlled clock system, three automatic elevators, a power operated dumb-waiter, and motorized overhead doors for the truck dock.

Limited wiring space

In general, the construction is welded steel frame with metal decking and four-inch concrete floors. The minimum floor to floor heights required very close coordination between the electrical contractor and other trades. Definite spaces were provided for piping, conduit, and duct work, and the various systems had to run in these spaces as no other space was available. The lighting fixtures and air conditioning facilities were designed into the structural system, which necessitated specially manufactured lighting fixtures.

Power for the building was taken from an underground transformer vault, furnished and installed by the Dallas Power and Light Company, adjacent to the basement wall. The incoming service is 120/208 volts, three-phase, four-wire, which feeds into the main switchboard through busduct.

(Continued on page 128)

High frequency increases

This comprehensive article discusses four distinct high frequency systems in use at the present time. They are distinguishable primarily by method of frequency conversion and lamp circuits.

By R. D. Burnham

R. D. Burnham and Associates
Electrical and Lighting Consultants
Lorain, Ohio

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers ✓
- Consulting Engineers ✓

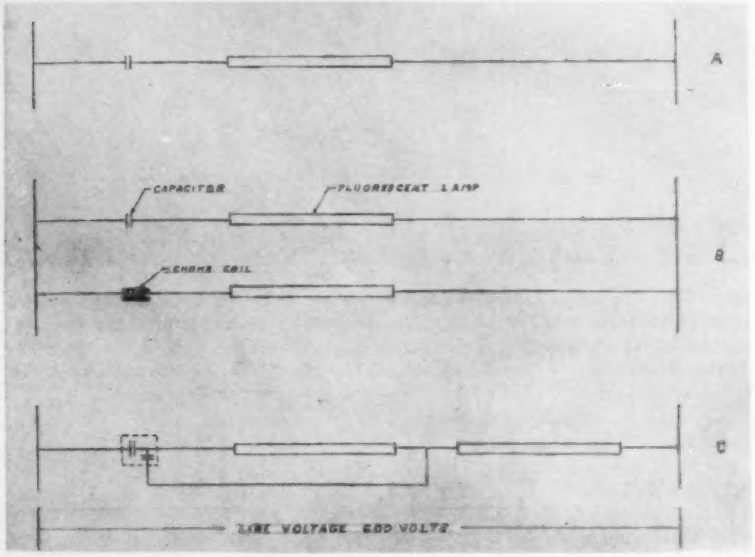


Figure 1. (A) Simple capacitor lamp circuit—low power factor. (B) Split phase ballasting; choke coils and capacitors used alternately. (C) Two lamp series circuit, power factor about fifty per cent.

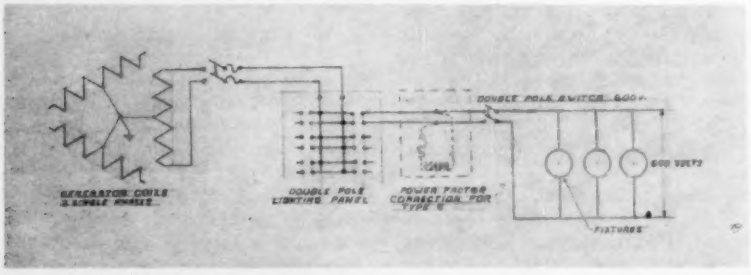


Figure 2. Typical method of distribution for types B and C. Three phase generator windings center tapped to ground to conform to Section 2113 NEC requiring less than 300 volts to ground.

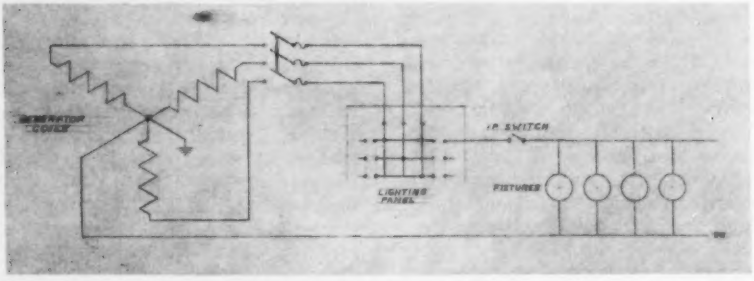


Figure 3. Type D distribution system similar to conventional three phase, four-wire system. Voltage either 277/480 or 120/208.

◆ THE USE of high frequency fluorescent lighting has steadily increased during the last few years. It was used in specialized areas to eliminate the need of remotely mounted ballasts, and in larger areas on an experimental basis. Both the lighting performance and the overall economics looked promising, so more installations were encouraged while work continued in the laboratory. Today a variety of larger installations are being installed and many more are in the planning stage.

Houston installation

One of the most unique of these is the Federal Reserve Bank Building in Houston, Texas. This three story, windowless building is nearly completed and relies on an 840-cycle frequency changing system for lighting to keep the building in operation 24 hours a day every day of the year. Architects Goleman and Rolfe, of Houston, and their engineer, Dana Price, were among the first to realize the advantages of high cycle lighting for the entire building. Collaborating with specialists in the field, they selected the 840-cycle system as the most suitable at that time.

Power is supplied to the lighting in this building by seven 30 kva, 600 volt, 840 cycle permanent magnet generators. The M-G set has no brushes, slip rings or voltage regulators and is therefore, relatively maintenance free. The two motor bearings are the only

light and life of fluorescents

wearing parts which need periodic attention.

In the Federal Reserve building these units are being automatically paralleled as lighting load increases. Usually the paralleling of generators requires motor speed control and speed adjustment equipment to bring two generators into synchronization. This is not necessary for this equipment. The generators are so matched that they may be tied directly together without synchronization. This enables the use of lower cost standard induction motors and eliminates elaborate control equipment.

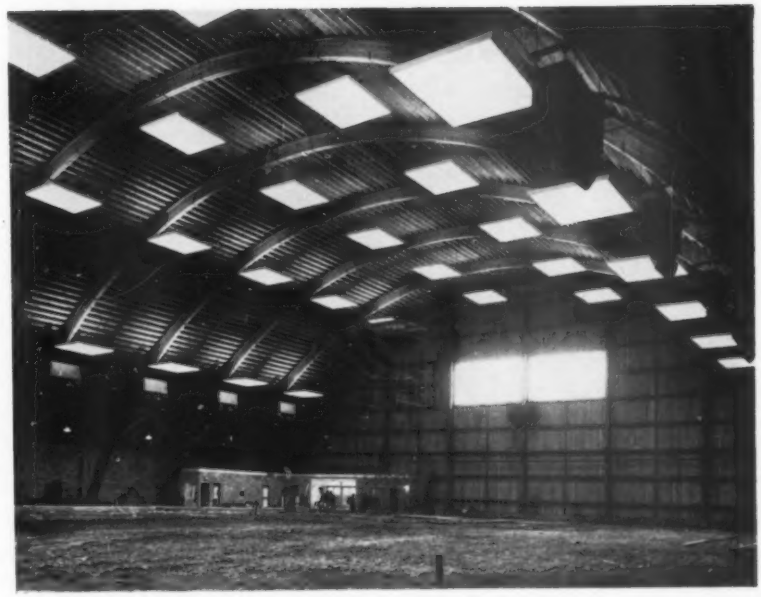
Four of the seven generators are controlled in one group, three in the other. Current sensing elements automatically signal relays to start the M-G set and connect it to the lighting distribution bus bars as more generating capacity is required. As the lighting load decreases, the generators are disconnected and stopped. The system is completely automatic and, compared with similar equipment, relatively simple.

Since the activities of this building require that lighting and power be available at all times, a standby diesel generator is automatically started in case of a power failure. This 60 cycle generator supplies power to the group of three 30 kva lighting generators as well as to other 60 cycle electrical equipment. This emergency system provides one third to one half lighting to all critical areas.

Few incandescents used

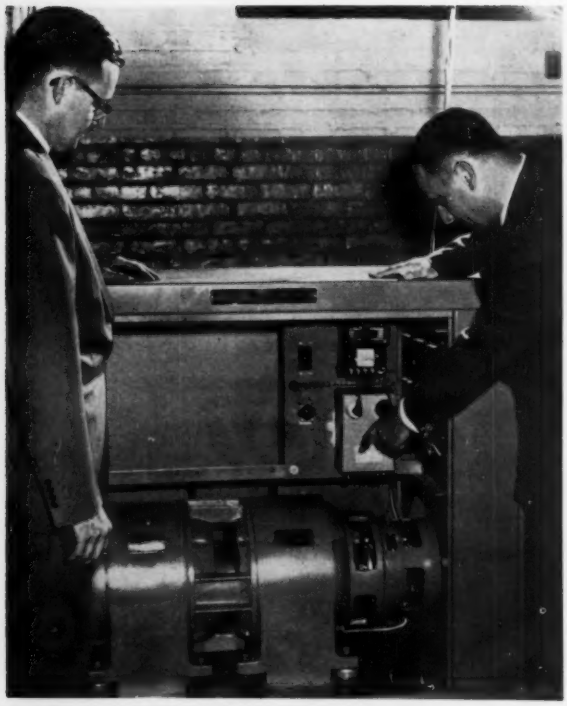
The lighting is nearly all fluorescent. A few incandescent lamps in exit signs and storage areas are also operated from the 600 volt, 840 cycle circuit. All high frequency incandescent fixtures use two 300 volt lamps in series.

Luminous ceilings and troffers with plastic diffusers using eight foot lamps are used throughout the building designed to provide from 40 to 70 footcandles. Eight-foot, six-foot, four-foot slimline, five-foot T-17, and a few two-foot 20 watt lamps are used. A 600 milliampere lamp current is used boosting the light output about 22

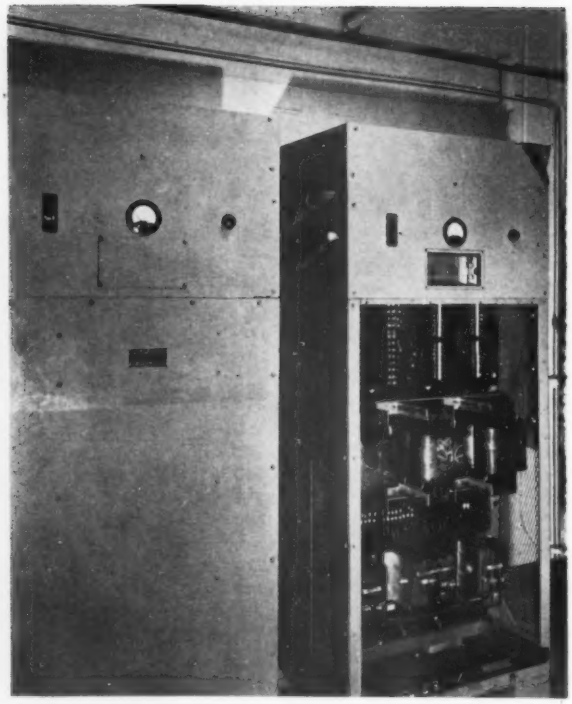


The split phase circuit shown in Figure 1-B has a ninety per cent power factor. Capacitors and inductances are used alternately in series with each lamp. This system was first installed at the Union College Field House, in Schenectady, N. Y. Each eight-foot square fixture contains fourteen slimline lamps, providing forty-five footcandles in service.

This plant growing area in Beltsville, Md., represents the first type of system developed and put into use. These installations are generally specialized areas where relatively small isolated lighting loads are encountered. Ballast is a capacitor in series with the slimline lamp.



Two 30-kva 400-cycle generators of this type are employed for the Type B high frequency fluorescent lighting installation which was first used at the Union College Field House.



Output current on this 360 cycle square wave static magnetic frequency multiplier can be varied by the control knob on face of panel (Type D installation). Construction is essentially that of a transformer.

per cent thus making it possible to use proportionately fewer fixtures.

One of the major advantages of high cycle lighting is the elimination of the brick type ballast. Unlike the incandescent lamp, which limits the current as it warms up, the fluorescent lamp passes an increasing amount of current and would soon destroy itself if some current limiting element was not in series with it. This element could be either a resistance, capacitor, or inductance.

At a frequency of 60 cycles an inductance is usually selected because of higher over-all efficiency at lower frequencies.

At high frequencies, above 300, it becomes practical to use a capacitor rather than an inductance. Due to the charging and discharging time of the capacitor at lower frequencies the lamp current is peaked and inefficient lamp performance results. At high frequencies this characteristic disappears.

The low losses, good reliability, and low cost makes the capacitor a desirable current limiting element. In areas where ballast noise and heat is troublesome such as refrigerated areas, plant growing rooms, and television studios, the capacitor is welcomed. A capacitor in series with a single lamp has been used in some cases but the low leading power factor, about 25 per cent or less, requires a high kva inductive reactance across the line to correct power factor resulting in high circulating currents.

Numerous circuits

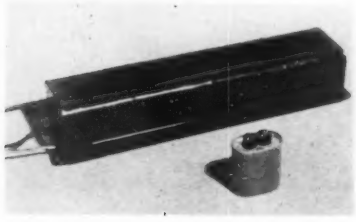
A new sequence start circuit was developed for the Federal Reserve building (Figure 1-C). Lamps start in succession and then operate in series. This cuts the power factor correction kva in half and reduces the auxiliary losses. In Houston, these power factor correction coils are mounted in a sound-proofed metal enclosure adjacent to the lighting panels.

The split-phase circuit shown in Figure 1-B has a 90 per cent power factor. Capacitors and inductances are used alternately in series with each lamp. This system was first installed at the Union College Field House, Schenectady, N. Y., several years ago. Two 30 kva, 600 volt, 400 cycle generators supply power to 490 eight foot slimline lamps in specially designed lighting fixtures. The 600 volt supply voltage reduced the number of circuits and reports indicate a savings of 10 per cent over the filament and mercury lighting intended. This system gives the maximum wire savings and has been used in several installations similar to this where long circuit runs are encountered.

The higher distribution voltage may lend itself well to industrial lighting where relatively large groups of lamps are switched at one time. In commercial buildings where smaller groups of lamps are switched, experience has shown that the full capacity of the 600 volt circuits are rarely used, so circuits capable of carrying 40 or 50 eight foot lamps seem to work out as well as 600 volt circuits capable of carying 80 to 100 lamps. Number twelve branch circuit wire is used in either case.

There are four distinct high frequency systems at the present time. Each of these is arbitrarily designated with a letter for later convenience of identification. In some cases these designs are quite fluid and may be modified to al-

The Type C system, installed in the Houston Federal Reserve Bank uses a standard induction motor, left, and an 840-cycle permanent magnet generator, right (30 kva, 18x30 inches plus front wiring compartments).



A two-lamp brick type ballast is compared here to a small single lamp high frequency capacitor which replaces it.

most merge into another system. They are distinguishable primarily by method of frequency conversion and lamp circuits.

Type A

This was the first system developed and put into use. The frequency changer is a static harmonic multiplier with a 360 cycle output. The first multipliers of this type had a 5 kva capacity, now slightly larger units are being designed. The distorted voltage wave gives nearly a square current wave with a lamp efficiency increase of nearly 25 per cent for standard lamp currents. The ballast is a capacitor in series with the slimline lamp. (Figure 1-A).

These installations are generally specialized areas where relatively small isolated lighting loads are encountered (See photo of plant growing area). The output current of the multiplier through a limited range providing some control over lamp brightness. Maintenance is low since the multiplier has no moving parts.

This system is limited in its use since the capacity of the multiplier

(Continued on page 126)

Table I—Comparison of 60 cycle ballast and high frequency capacitor[1]

	2-lamp 60-cycle series ballast	2-lamp 840-cycle series capacitor
Size	74 cubic inches	6 cubic inches
Weight	150 oz.	4.5 oz.
Wattage	30 watts	2.5 watts[2]
Noise	E rating	low
Line current	1.55 amps	.430 amps[3]
Cost	$10.10	$1.60

[1]The values in this table are approximate and intended for general comparison only.

[2]There are also losses in power factor reactors and frequency converter. Total auxiliary losses 18 watts.

[3]Additional power factor correction units are usually required. After correction line current .240 amps.

Table II—General comparison between dominant high frequency systems

Subject	System type B	C	D
1. Voltage	600[1]	600[1]	277/480
2. Frequency	400	840	540 to 3000
3. Output phases	3	3	3
4. Type of distribution	1-phase	1-phase	3-phase
5. Number of main feeder wires	6	6	4
6. Circuit breaker	2-pole, E or F frame	2-pole, E or F frame	standard single pole
7. Voltage at switch	600	600	277
8. Type of switch	2-P, 600 v industrial	2-P, 600 v industrial	1-P, 277 volt
9. Power factor correction required	No	Yes	No
10. Number of 8 ft - 90 watt lamps per circuit (14 amps)	82	44 before correction 82 after correction	39
11. Power factor	90%	50% before correction 90% after correction	90%
12. Ballasting losses two 90-watt lamps	20	2.5 capacitors 6 power factor coils	3.5 watts
13. Type of circuit	split phase	series sequence start	series resonance
14. Lamp efficiency increase above 60 cycles	same	same	10%[2]
15. Lumens 90-watt, 8 ft T-12	6050	6150	6800[2]
16. Percent increase in light output compared to 430 ma 60 cycles	19.6%	21.8%	34.6%
17. Voltage wave shape	sine	near sine	triangular
18. Lamps which can be used	Instant starting (slimline)	Instant starting (slimline)	Any (rapid start, slimline, preheat, high output)
19. Frequency conversion	Motor-generator	Motor—permanent magnet generator	static multiplier
20. Efficiency frequency conversion - 30kva	80%	84%	89%
21. Overall lumen/watt[3] efficiency compared to 2 - 8 ft series 60 cycles	85%[4]	96%	116%
22. Number of lamps per 1000 sq. ft. - 50 for 60 cycles[5]	42	40	36
23. Number of 2-lamp fixtures eliminated per 1000 sq. feet 25 required for 60 cycle[6]	4	5	7

[1]May be 400 or 600 volts, generator coils center tapped and grounded to comply with NEC.

[2]Values estimated from data available.

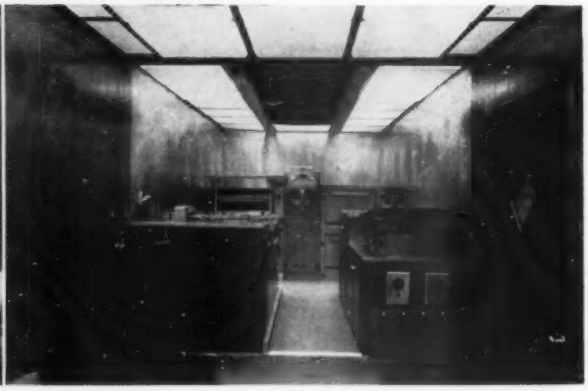
[3]These values are based on lamps operated at higher lamp currents. At standard lamp currents l/w efficiency increases and in most cases surpasses 60 cycle operation.

[4]This is a lead lag circuit which is compared to a series 60 cycle circuit.

[5]Assuming 65 footcandles maintained, coefficient of utilization .37, maintenance factor 70 per cent.

[6]Same assumptions as 21.

The auditorium and stage, housed in the 34-foot trailer, are lighted by a wall-to-wall luminous ceiling.



Above the plastic panels are continuous rows of 40-watt rapid-start fluorescent lamps on one-foot centers.

Mobile lighting demonstrator

By John B. Deck, Jr.
Lighting Sales Engineer
Texas Power & Light Company
Dallas, Texas

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

Texas Power & Light Company keeps hinterland business customers up-to-the-minute on latest commercial equipment by means of a touring "electric circus," with live, on-the-spot demonstrations.

◆ TOURING OVER 400 towns in the Texas Power & Light Company service area is an eye-catching display of commercial lighting, cooking, heating, and cooling equipment—the "Commercial Electric Circus." It is housed in a 34-foot highway trailer, gaily painted in multi-colored circus designs against a bright yellow background.

Inside is an auditorium seating 20 persons and a stage full of heavy-duty commercial cooking equipment. The auditorium and stage are lighted by a wall-to-wall luminous ceiling. A suspended grid of extruded aluminum Tee-bars supports the two-foot square molded vinyl plastic diffusers 8½ feet above the auditorium floor. A band of injection molded plastic louvers runs around the auditorium perimeter.

Above the plastic panels are mounted continuous rows of 40-watt rapid start fluorescent lamps on one-foot centers. Alternate rows contain deluxe cool and deluxe warm lamps on separate dimmer circuits. Control units rated at 2,000 watts are used on each circuit in conjunction with special rapid-start dimming ballasts.

Each circuit on full brightness provides 55 footcandles of warm or cool light. Both together give 110 footcandles, or any desired blend of color and illumination can be selected.

Over the stage, plastic louver diffusers are used with basic illumination from two-lamp rows of

(*Continued on page* 129)

This commercial electric circus, sponsored by TP&L, houses an auditorium which seats 20 persons and a stage filled with eye-catching commercial lighting, cooking, heating, and cooling equipment.

The decorative effect which can be achieved in step illumination is demonstrated here in the channeled sloping handrail.

Front entrance residence lighting

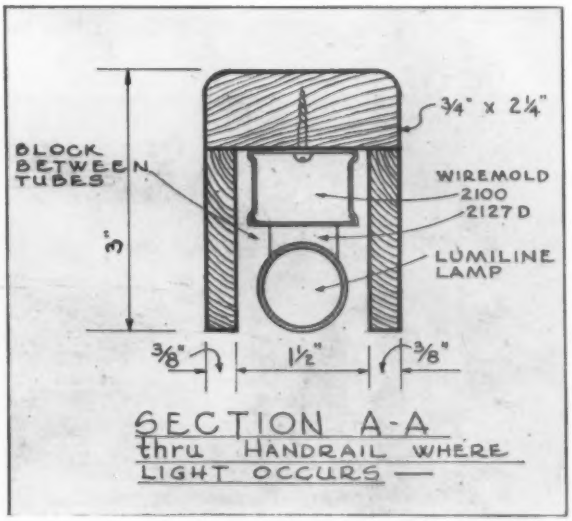
By Jack H. Murrah
Division Sales Supervisor
Georgia Power Company
Atlanta, Ga.

This article should be especially helpful to the following readers:

Electrical Contractors	✓
Electric Utilities	✓
Electrical Wholesalers	✓
Electrical Inspectors	
Industrial Engineers	
Consulting Engineers	✓

◆ The accompanying photographs and drawings show a unique solution to the problem of lighting the front entrance steps of an Atlanta residence of contemporary design. Due to the skeletal nature of the cantilever porch, no conventional fixture could be installed for step

(Continued on page 131)



Drawing above shows details of installation at left. Lamps are concealed from all normal viewing angles, yet are readily accessible for maintenance.

Relighting

Competition among eating places in this Florida resort city is at an all-time high. To meet the challenge, older cafeterias are utilizing "attraction" lighting and are getting results.

By J. Allyn Stone
Lighting Specialist
Florida Power Corporation
St. Petersburg, Fla.

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers ✔

The Garden cafeteria creates the feeling of outdoor dining by use of PAR 38 projector lamps on 18" centers in side-wall coves to flood high arched ceiling for totally indirect daylight effect in "patios."

A combination system of fluorescent and incandescent fixtures is used to an advantage in St. Petersburg's Orange Blossom cafeteria, giving appearance of clean, modern brightness, conducive to relaxed dining.

The Dixie cafeteria is illuminated with a combination of suspended incandescent dome chandeliers, augmented with inverted fluorescent coves. For brightness, the foyer is lighted with plastic louverall ceiling.

◆ CAFETERIAS IN the St. Petersburg area are meeting the challenge of increased competition with "attraction" lighting.

During the past few years, the St. Petersburg area has seen the largest tourist influx in its history. Careful estimates by the Chamber of Commerce indicate that there are 1,250,000 visitors to St. Petersburg and neighboring Clearwater each year.

To meet the tremendous demand for meals, the number of food-serving establishments has increased until competition for the tourist food dollar has become intense. Each owner now tries to offer higher quality, better service, and a more attractive location than can be found elsewhere. He has learned that lack of any of these three factors soon becomes apparent at the cash register.

The attractive appearance factor is most noticeable in cafeterias. During the past three years, four older cafeterias have been completely remodeled and three new ones opened, utilizing special lighting as a magnet to draw customers. The old school of thought that

to compete

"just any" type of lighting was suitable has become passe'.

The first older place to "see the light" and the value thereof was the Garden in St. Petersburg, which has an interior designed to create the feeling of outdoor dining. The owners asked our Commercial Department for a relighting plan to eliminate the problem of maintaining the old, unattractive fixtures, suspended from the high arched ceiling in the "garden" area, and to brighten up the "patio" beneath the lower ceilinged areas. The lighting was to be suitably bright for cafeteria dining, yet comfortable and easily maintained. They also requested our recommendation for attraction lighting for the front.

The interior relighting problem was solved by using PAR38 projector lamps on 18" centers in coves along each side of the "garden" area to flood the high arched ceiling for a totally indirect daylight effect, and with fluorescent coves in conjunction with incandescent recessed lens boxes in the lower "patio" areas. The front was lighted by fluorescent strips concealed behind wooden louver beams and a valance along the front wall which silhouetted a black letter sign. The effect inside and out was one of cheery brightness, both comfortable and attractive.

The Orange Blossom in St. Petersburg soon followed suit with a complete remodeling and relighting job for a more attractive atmosphere. A combination system of fluorescent and incandescent fixtures was installed. The result was an appearance of clean, modern brightness, comfortable for relaxed dining.

Two larger St. Petersburg cafeterias to relight soon afterwards were the Home Dairy and the Dixie. The former used recessed indirect silvered bowl ceiling fixtures for general lighting, with suspended incandescent bullets over the serving area.

The Dixie was relighted with a combination of suspended in-

(Continued on page 128)

St. Petersburg's Home Dairy achieves a feeling of welcome and cheer with the use of recessed indirect silvered bowl ceiling fixtures for lighting, with suspended incandescent bullets over serving area.

Driftwood No. 1, one of St. Petersburg's newest cafeterias, uses lighting to attract customers. A combination of fluorescent coves with incandescent chandeliers and recessed downlights provide cheer.

Incandescent chandeliers and suspended bullets illuminate attractively the new Driftwood No. 2 cafeteria and achieve both beauty and utility. Installations were planned and directed by Florida Power Corp.

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increase protection, buy Westinghouse

there was a time when a boxful of spaghetti wiring and a jumble of literally "shocking" fuse blocks was called a panelboard. Few folks still think there's a reason for such equipment.

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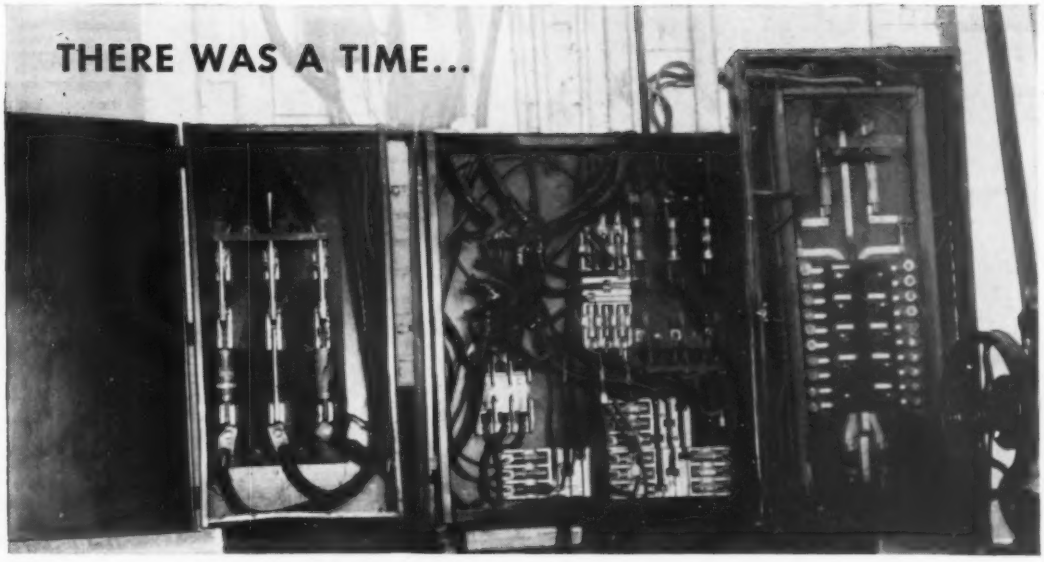
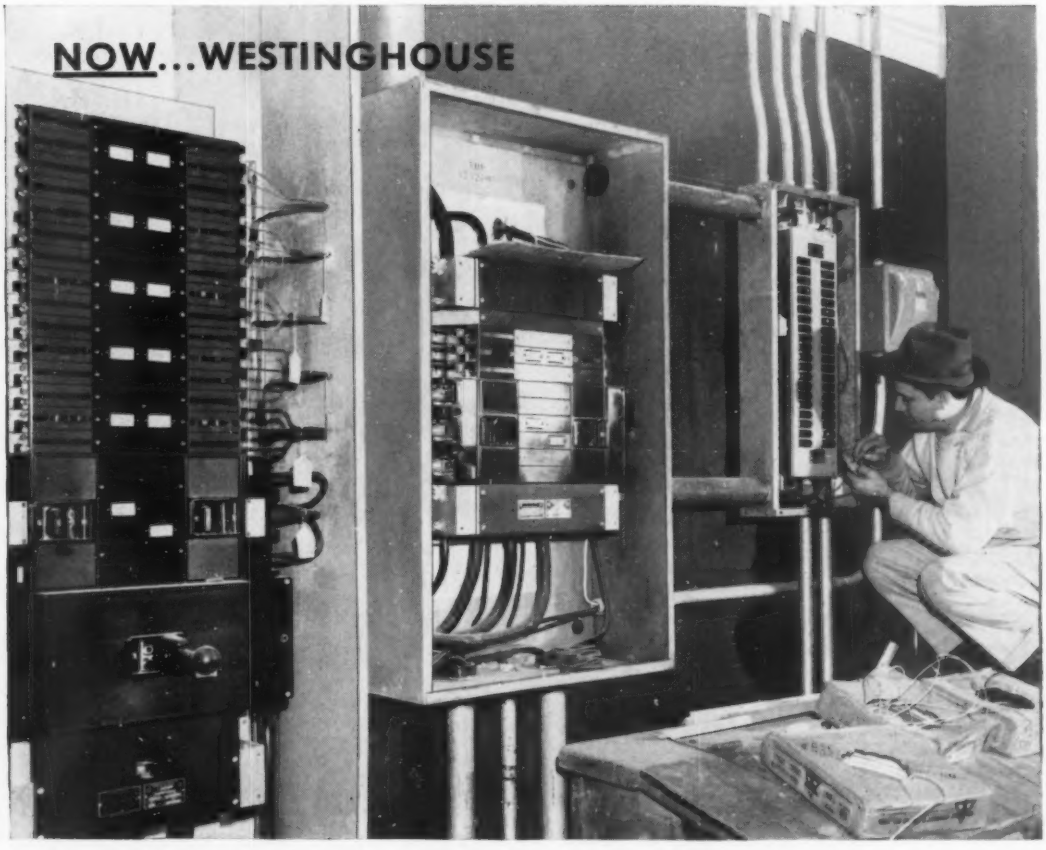

THERE WAS A TIME...


NOW...WESTINGHOUSE

Demonstration test facility for street and highway lighting

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers ✔

◆ A DEMONSTRATION ROADWAY lighting facility where more than 30 different lighting combinations can be observed has been unveiled at General Electric's Outdoor Lighting Department, Hendersonville, North Carolina.

Although the demonstration streets measure less than one-third of a mile in total length, they offer opportunities for demonstrating the effects of virtually every combination of modern lighting that can currently be applied to American's roadways.

Joseph T. Bailey, general manager of the Outdoor Lighting Department, said it would be necessary for an individual to visit 25 to 30 different towns to see everything that can be seen at one time and in one spot at Hendersonville. "As far as we know, this is the only facility of its type anywhere in the world."

The area is designed to provide practical demonstrations of all types of street lighting equipment on different types of pavement and on all major street classifications. Here users of street lighting equipment — municipal officials, state highway representatives, electric utility lighting engineers, and others—can compare and evaluate different light sources for a variety of applications.

The company will use this facility to conduct extensive studies, investigations, and research on how well the night driver actually sees under various roadway lighting systems. The area will also serve as a proving ground similar to those used by automobile manufacturers in that it will aid the company in developing improved equipment to help reduce night hazards for motorists and pedestrians.

A master control panel enables an operator to make rapid changes of lighting setups so viewers may compare effects of all three major light sources—filament, mercury, and fluorescent—on streets similar to those found in any community. Comparisons can be made of effects created by the newest, most modern luminaires and older lighting fixtures still in use on many American streets.

Provision has been made for testing the effect of all three major light sources on residential streets, traffic streets, main business streets, and whiteways varying in width from 25 to 70 feet. More than 130 luminaires of 15 different types are mounted on steel, aluminum, concrete and wood poles with a variety of brackets. Both overhead and underground wiring is used and multiple and series circuit equipment is demonstrated.

Included in the demonstration area is a 100-foot stretch of parallel-to-roadway fluorescent street lighting — an experimental new system of roadway illumination under development by the Outdoor Lighting Department. In addition, there is a demonstration of "T-lighting"—an offshoot of parallel lighting. General Electric engineers have mounted two Form 206S luminaires end-to-end and parallel to the curb at the base of a normally-mounted Form 406S

(Continued on page 131)

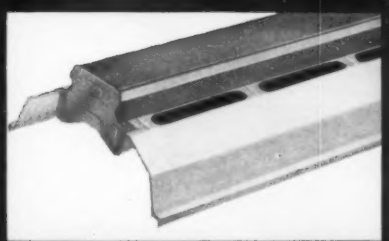
This "proving ground" at Hendersonville, North Carolina, makes possible the demonstration of more than thirty different roadway lighting systems and will be used by engineers in their quest for improved street and highway lighting equipment to aid in reducing night hazards for motorists and pedestrians. The one-third mile road network is showered by more than 130 street lighting fixtures of fifteen different types.

Wheeler ULTRA-NEW

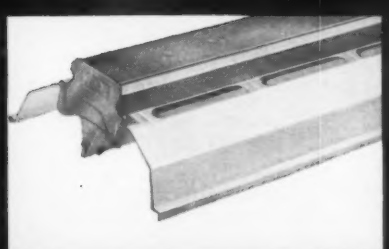
POWER-LUME

gets the most out of the new

POWER-GROOVE LAMPS



POWER-LUME F



POWER-LUME V

Distributed exclusively through electrical wholesalers.

Delivers **TWICE** the amount of lumen output per foot of lamp length!

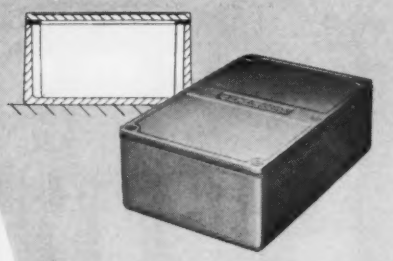
Today's big news in industrial lighting. 2 outstanding Wheeler units — Power-Lume F and Power-Lume V — specifically designed to utilize *fully* the extra illuminating power of the new Power Groove Lamp. Both fixtures are designed for all medium to high mounting applications . . . provide more comfortable seeing, cooler lamp operation, thanks to Wheeler's unique diffuser apertures that direct MORE than 20% of the light upwards.

POWER-LUME F (porcelain reflectors) are ideal for use where rough work is being performed and shielding is unimportant. Where reduced brightness is required, Power-Lume F with aluminum reflectors does the job best.

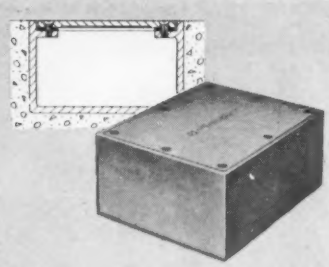
POWER-LUME V (with drawn one-piece porcelain reflectors) with increased shielding is the perfect lighting answer for those areas where more difficult seeing tasks are being performed. For maximum seeing comfort, Power-Lume V with drawn one-piece aluminum reflector is recommended.

Write for New Product Data Sheet No. 100 D
NEWEST UNIT IN WHEELER'S "PACKAGE PLAN" LIGHTING

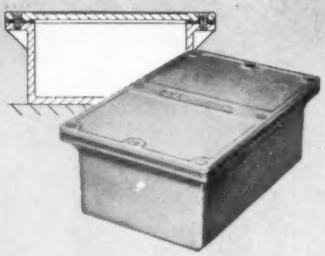
WHEELER REFLECTOR CO. (Division of Franklin Research Corp.)
275 Congress St., Boston, Mass.



Type "YS" This unit is unflanged for surface mounting, and it is Dust-Tight and Weatherproof. The simplest in design of all the Cast Iron Boxes in the broad O.Z. line, the Type "YS" is also the most popular and the most widely used. UL approved. 133 sizes.



Type "YU" A Recessed Cover Junction Box, the Type "YU" is designed especially for flush mounting in masonry. Weatherproof and Dust-Tight, the box has an inside flange and recessed cover. UL approved. 43 sizes.



Type "YF" UL approved as Raintight, the "YF" is Watertight and submersible under a 20 foot head of water. Designed for outdoor use, this unit is recommended wherever a watertight installation is required. 78 sizes.

O.Z. means more for you

- CAST IRON BOXES
- CABLE TERMINATORS
- POWER CONNECTORS
- SOLDERLESS CONNECTORS
- GROUNDING DEVICES
- CONDUIT FITTINGS
- INTERLOCKED ARMOR CABLE FITTINGS

Distributed exclusively through electrical wholesalers.

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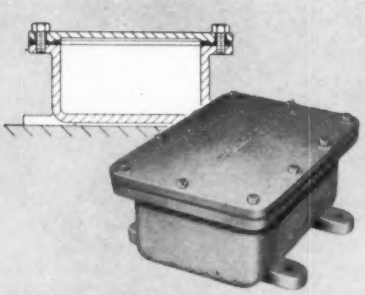
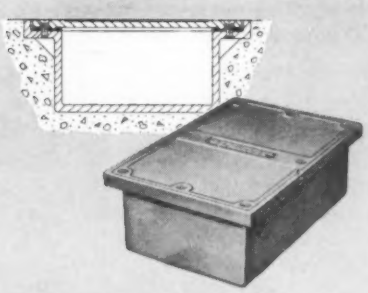
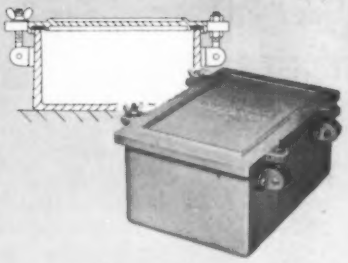


Type "YH" This is a heavy duty box, with extra-thick walls. It is listed by the Underwriters' Laboratories, Inc., as Raintight. Type "YH" boxes are submersible under a 50 foot head of water. 80 sizes.



Type "YR" An outside flanged recessed cover box, approved by the Underwriters' Laboratories, Inc., as Raintight, the Type "YR" is designed for flush mounting in walls or floors. 45 sizes.



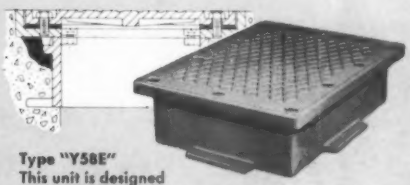
Type "YW" A hinged cover box, the Type "YW" makes an ideal enclosure where equipment within the box must be inspected frequently and easy access is required. This unit has been approved as Raintight by Underwriters' Laboratories, Inc. 110 sizes.

O.Z. gives you 10 types–678 sizes to choose from!

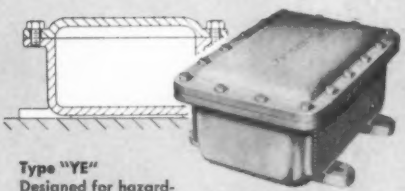
O. Z. Junction Boxes are built in such a wide, wide range of types and sizes that they meet almost unlimited *standard* requirements! In addition, all O. Z. Junction Boxes can be supplied with modifications that meet *your* specific applications exactly. Materials, conduit entrances, and mounting lug locations all may be varied. Yet, no matter how you order, O. Z. Junction Boxes embody—in design, in detail, in materials, in workmanship—the high standards of quality characteristic of *all* O. Z. products. Next time you need junction boxes, take advantage of the largest selection available in the industry! Make O. Z. your first choice ...It's your biggest choice!

Call your local O. Z. distributor, or write direct to the company for complete information.

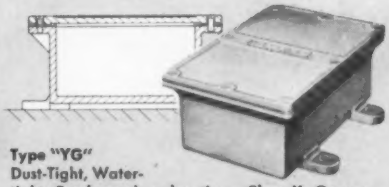
Type "YT"
This box is designed to be mounted in sidewalks and other flat concrete surfaces. The checkered cover has reenforcing ribs and is made to withstand pedestrian and light vehicular traffic. 33 sizes.



Type "Y58E"
This unit is designed to top off an underlying concrete pull box. The flange and cover can be replaced without disturbing the box the same as the Type "YT". 5 sizes.



Type "YE"
Designed for hazardous locations, Class I, Group D. Type "YE" boxes are Explosion-Proof, Dust-Tight, and Weatherproof. All joints are of the metal to metal type, ground to exceptionally close tolerances. 80 sizes.



Type "YG"
Dust-Tight, Watertight. For hazardous locations, Class II, Groups E, F, and G, covering atmospheres containing metal dust, carbon black, coal or coke dust, and grain dust. 76 sizes.

O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND STREET • BROOKLYN 17, N. Y.

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Integrated lighting for large interiors

◆ A NEWLY DEVELOPED ceiling system which incorporates lighting, acoustical control, and structural header sections to receive removable partitions was recently installed in the offices of a large insurance company.

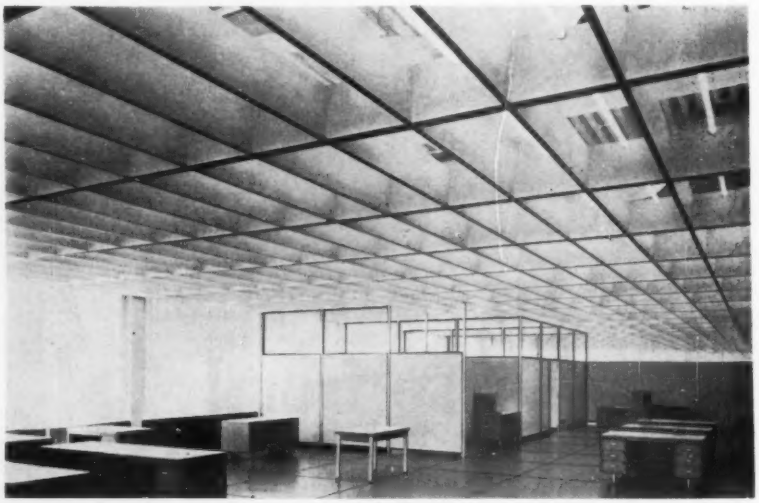
This system, developed by Smithcraft Lighting, gives complete freedom to the architect, engineer and contractor to place ducts, feeds, pipes, sprinklers and other services above the system without predetermined pattern. This is possible because the new system is in effect a large grid-work positioned below all structural members of the building and the services. This grid-work forms an open-type of dropped-ceiling which takes advantage of the height above the system to convey an unusual feeling of loftiness.

The system has a very high lighting maintenance factor which contributes significantly to its high lighting efficiency. The lamps, which operate in space, stay cleaner longer and the resulting better maintenance factor makes for greater efficiency.

The visual comfort of the system is accomplished by the low brightness of the lamps (operated on 120 ma) and by the shielding of the transverse members of the grid system which provide 45° shielding perpendicular to the lamps.

The transverse members of the grid system consist of perforated metal shells which contain a fiberglass filling to provide acoustical correction to the area. Since the sound-absorbing baffles are vertically suspended in free space, they are utilized to greater efficiency in the control of "sound-spreading." Office and building interiors are rendered much less

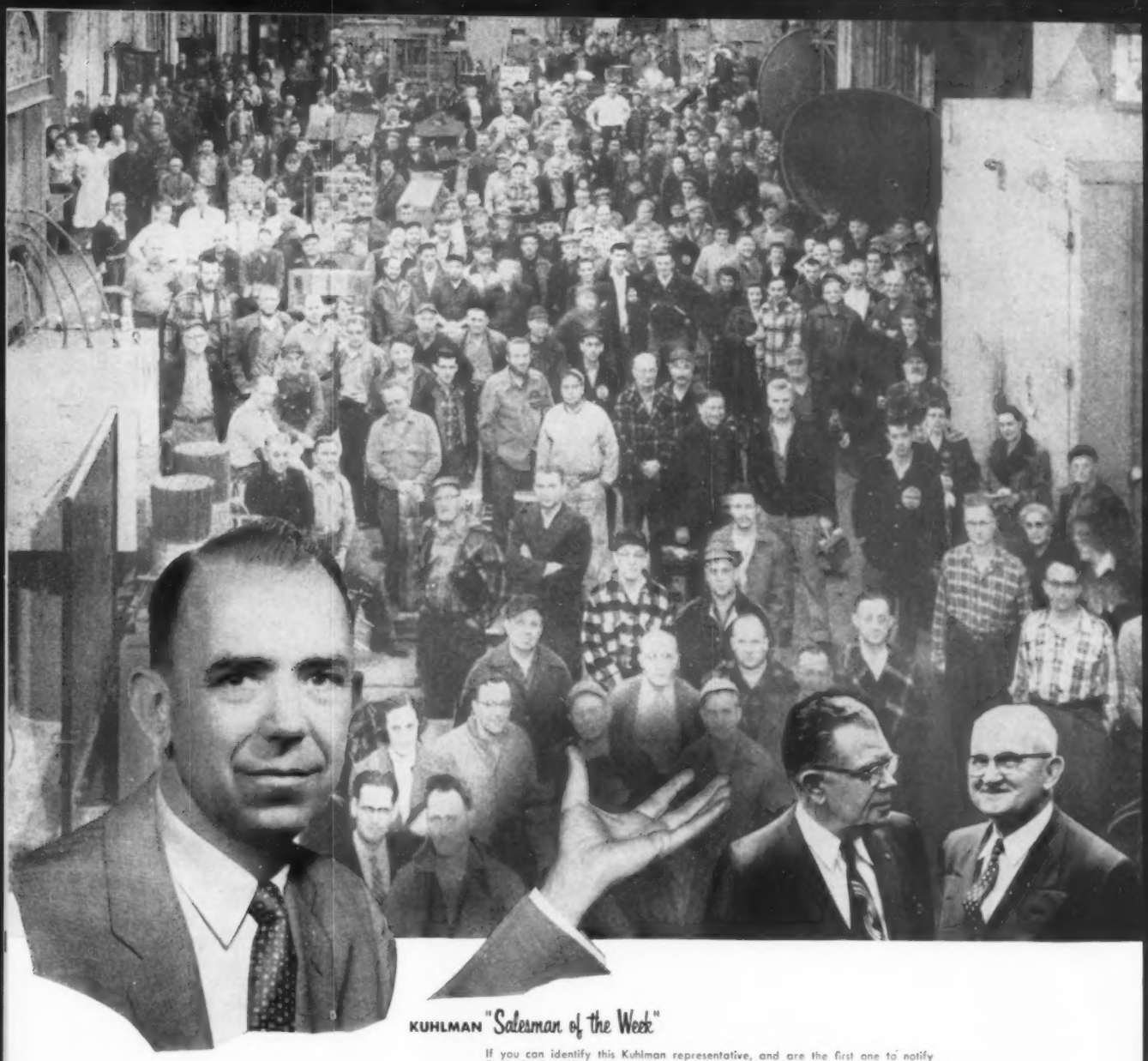
(Continued on page 129)



Completed installation above illustrates the interesting structural pattern designed to enhance the interior of a large insurance company's general offices. Lamps operate in open space, stay cleaner longer, resulting in greater efficiency.

Longitudinal members of the grid contain all wiring and circuiting necessary to operate lamps. Bottom grooves receive and support movable partitions.

Grid is completed with installation of transverse members consisting of perforated shells which contain fiberglass filling for acoustical correction.



KUHLMAN "Salesman of the Week"

If you can identify this Kuhlman representative, and are the first one to notify Dept. SA-1, Kuhlman Electric Co., Bay City, Mich., you will receive a valuable gift.

"Meet the people who make Kuhlman transformers"

"The gentleman at the extreme right is John Franklin, our Bay City factory superintendent. John's been building transformers nearly all his life. He has been with the company more than 40 years.

"Next to John is Cliff Lefler, President of our "Quarter Century" Club. Cliff tells me that the club's membership now represents more than 7% of our employment.

"In fact, 50% of our people have been with the company more than 10 years—over 25% more than 15 years!

"Low labor turn-over . . . years of on-the-job experience . . . quality craftsmanship have been our "way of life" since 1894. You'll find us the kind of company you'll enjoy doing business with. Ask anyone of our thousands of satisfied customers."

KUHLMAN ELECTRIC COMPANY

5718A

GENERAL OFFICES: Birmingham, Michigan

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

Modular fluorescent ceiling

An artistic application of ceiling lighting is demonstrated here in an automobile showroom with creative use of acoustical baffles.

Functional, yet clever, use of acoustical baffling wedges can add a greater feeling of depth and space to public lobbies and display areas.

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers ✔

◆ A CEILING LIGHTING system which permits the creation of a wide variety of custom designs from a few standard parts is one of the newest contributions to the popular trend toward wall-to-wall fluorescent ceiling lighting. It is a modular, inter-changeable plastic panel system that may be designed in an almost unlimited variety of over-all patterns of color, form, texture and style.

The "Sylva-Lume," which was developed by Sylvania Electric Products, Inc., in collaboration with the industrial design company of Peter Muller-Munk Associates, is adaptable for use in offices, stores, hotels, auditoriums, schools and public buildings. The system eventually will be extended to applications in the home, especially in the living room and kitchen.

Frank J. Healy, Sylvania director and vice-president in charge of lighting operations, said at a demonstration conference recently that the Sylva-Lume permits an architect, designer, or builder to custom-produce a ceiling lighting system that is unique in appearance. While permitting the artistic approach to ceiling design, it is based on the fundamental of technical lighting excellence. In the combining of lighting and ceiling design, the industry offers architects and illuminating engineers the right tools for creative planning.

Conventional standardized lighting system equipment has not permitted flexibility of ceiling design, except at great expense, and as a

offers complete flexibility

result, installations have had a sameness of appearance with which the architect was limited in what he could do.

Sylva-Lume claims the advantages of being ideally suited for unlimited interior design possibilities, with a minimum number of components. It can be changed or altered virtually at will simply by re-arranging the shielding. Economy is another advantage of the system as compared with custom-designed ceilings or many typical wall-to-wall ceilings. The complete ceiling ranges from $2 to $3 per square foot.

Components of Sylvania's new system include the Outrigger, a ladder-type, bare-lamp fixture, which provides a high degree of economy of installation for wall-to-wall lighting. Its H-shaped frame is eight or six feet in length and can be used for four-foot or eight-foot fluorescent lamps. Each unit accommodates a maximum of four lamps.

Three - foot - square contoured vinyl plastic diffusers, light-weight and fire-resistant, are available in three different designs and a variety of delicate pastel colors for subtle atmosphere. The panels are single or double layered, in shallow, deep or drumhead style. Available colors and color-combinations include white, softlight (pink) and yellow. Additional colors are possible later.

Acoustic wedges or baffles, three feet by five inches deep, are acoustically - treated, perforated steel with glass fiber filling. They provide sharp delineation of color as a contrasting medium. Colors are white, yellow, and blue.

Perimeter panels, sheets of flat steel with swiss-cheese-type holes, backed by plastic and available in three-foot-squares. They can be used anywhere as needed in the ceiling and can be cut easily with tin shears.

The track system, an extruded aluminum suspension grid system, is hung from the fixtures and supports the diffusing panels.

The ceiling in this modern class room is of three foot-square drumhead style diffusers, bordered by swiss-cheese-like perimeter panels.

Contoured vinyl plastic diffusers, available in three designs and a variety of delicate pastel colors, are adaptable to many interiors.

Wiring above Code requirements builds goodwill and extra profit

With a modest business in a small Florida town, this electrical contractor believes in going beyond Code requirements in all house-wiring jobs, to meet growing load of future appliances. He keeps a day-to-day record of operating costs of labor and material.

By Harry J. Miller

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers
- Consulting Engineers

◆ "WE BELIEVE in doing all our work above Code requirements because the customer deserves a troublefree installation, and not the bare bones of a skimpy wiring system that will be inadequate as soon as he starts buying appliances." So reasons Thomas E. LaByer, Jr., who has been wiring as LaByer Electric in Nokomis since '49, and in this general area since 1932.

"Some of our competitors use #14 wire which is code here, but we won't use anything less than #12 in wiring for light and power," he adds. "Sure, it cuts into our profit at times but it's the surest way to insure cordial relations with townsfolk-customers and the community."

LaByer does a modest business with five men in his employ. Mrs. LaByer is bookkeeper. With a small operation, it is of prime importance to know where every dollar goes, and daily cost controls are considered by this husband-wife team as essential to track operations. Thus they don't need to wait until a job is finished to balance income against expenditures. They know every day just about how the contract will come out.

While watching material costs very closely, LaByer is particularly concerned with labor expense, since he feels this is the variable which can make or destroy profits. In the case of supplies, and because supply houses are distant from his town, this contractor is careful to see that orders are placed in ample time for delivery, and that none are wasted or disappear otherwise.

Mrs. LaByer tends the front office and has such a comprehensive knowledge of the business she can whip up an estimate on a fair-sized job while a customer waits at the counter. Her businesslike practice is to keep meticulous control on a daily and weekly basis, as well as figuring the final returns on every job.

LaByer is a working contractor who isn't content to remain at his office and run his jobs from a distance. He's got to know right down to the last splice if he's fulfilling his committments on schedule; if his workmen are giving full production and whether no slipshod work gets by. As a consequence, he puts in time himself on about every job of any magnitude.

While he doesn't pay premium wages, his workers are satisfied, since each man is assured a steady forty hours a week.

Every bit of material is checked out to the job and that returned is credited back.

"If the contractor or builder will let us," says LaByer, "we'll give him the adequate wiring job he needs in order to attract the type of buyer he seeks for his house. So far as our estimates are concerned, it's far better for us to attempt to clear $100 on one job than $50 a piece on 2 jobs.

"For example, we used to build our panels first, then wire the house. By that time either the builder or owner would decide he wanted more circuits added, so now we'll wire up completely, according to the original plan plus the changes, then go to work on the panel."

LaByer has also found it is good business when planning a bid or laying out a job for a householder, to determine number of circuits by totaling the number of power-consuming outlets the job involves, like baseboard plugs for appliances, etc.; then divide this figure by 8 and not by 10 as used by some contractors. "Our customers get a better shake for their money that way," he avows. Only two plugs are installed to a circuit designed for appliances like washing machines, with all half-horsepower or over on separate circuits, along with meeting code requirements that call for two dead-ended spare circuits on every new installation.

On time-and-material work, LaByer only gets involved with customers of unimpeachable reputation. Operating within the Henderson-Hazel framework, he uses a price of $5.50 for an outlet on a block wall where it has to be stubbed or sleeved in, and he figures on five per cent of the material cost as his overhead.

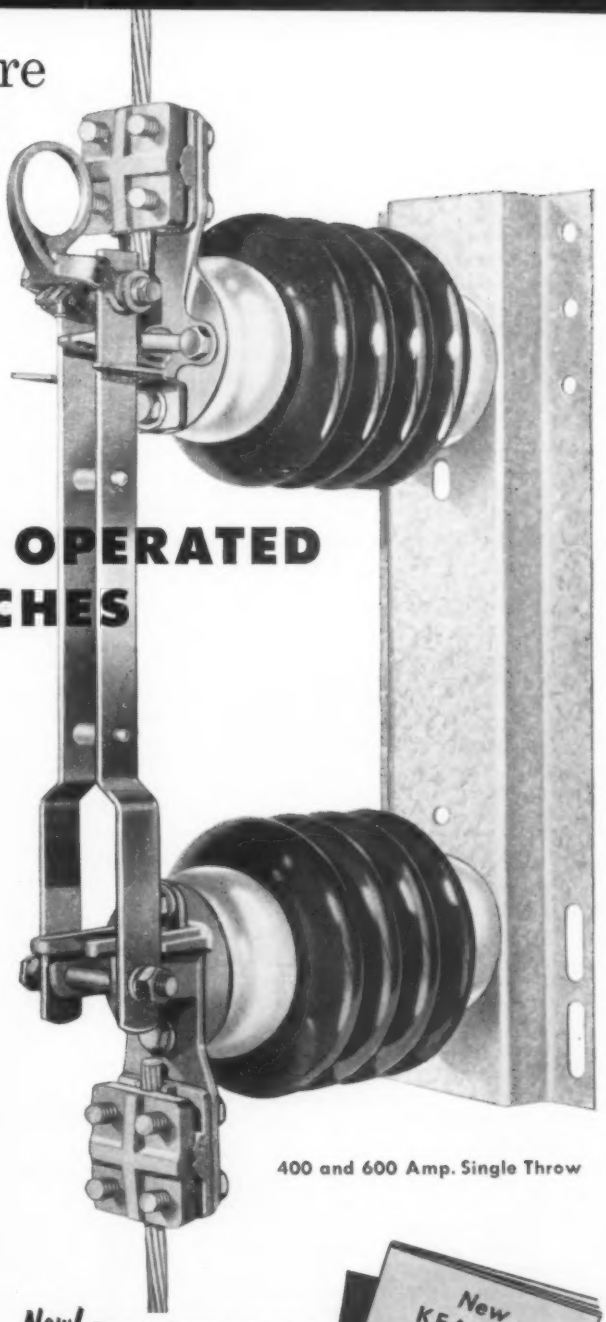
In his area, this contractor is primarily concerned with house-wiring, although he gets a fair share of commercial wiring also. His vexation steps from the fact that many single-homebuilders come in for an estimate without a print. "It then becomes our chore to set the job up and lay out the work according to the customer's wishes.

"Armed with our plan and estimate, they take them to other contractors for comparative bids."

"Anyhow, house plans are very often not drawn to scale, and when a customer comes back with a plan, perhaps because our price was better or it was only a little higher

new design for even more dependable service

Modern and reliable in every detail! New extra wide hinge and sturdy blade construction assure blade always hitting upper contact when closed from any practical angle. Design of current-carrying parts prevents misalignment from wear and distortion of blades. Non-current carrying hinge; positive blade lock; high leverage pry-out.



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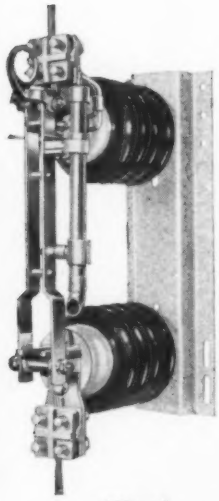

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and the customer feels the extra cost is better spent with an established shop like ours, we scrutinize the plan again. Chances are some changes have been made in it."

All changes beyond the original plan are charged for on a time and material basis. Naturally the better the plan, the easier it is for LaByer to estimate the job and if there are any unusually long wire or conduit runs: "You can't use short-cut methods of figuring on a per-outlet" basis.

The Nokomis contractor figures a dollar per amp on panel installations, and this includes cost of panel, the rigid conduit and the labor to install it and make the final connections.

His estimates are based on such figures as a man and helper roughing in a two bedroom house in a day, exclusive of the service, and the same-sized house should be completely trimmed out in eight hours by a man-helper team.

Setting a 100- to 200-amp service carrying three #3-0 takes 3½ hours. "We figure a good man will completely trim out work at the rate of eight to ten outlets an hour."

On underground work, LaByer estimates a man will dig 20 to 25 feet of trenching eighteen inches deep, in an hour. With underground work mostly ¾-inch, roughing in two ¾-inch runs in a 2-feet-deep, 210 feet long ditch, as in his service station wiring, takes two men 6 hours.

Examples of the price indexes LaByer employs, and which include panel box, labor and material are:

Space heater circuits	$10.00
Oven Circuits, 3 #10	20.00
Garbage disposal circuit #12-2 plus ground	10.00
Telephone circuits #14 plus ground	8.00
200 ampere service; panel (3-pole costs $55.66)	$200.00

On space heater circuits #12 wire with a ground is used, figuring 30 minutes labor per circuit. The $10 circuits is a separate run of 35 to 50 foot length from the panel to the space heater junction can.

Oven circuits are similarly figured on a 35- to 50-foot length with direct connection to built-in units, or from panel to connections at the oven's junction box.

For the cooking top of ranges, LaByer uses three #8's. On 35-50-foot runs, including connecting, he gets $25.

Light at night provided by windows of the future

◆ "TURN on the windows, it's getting dark." This is the way the housewife of tomorrow may ask you to turn on the lights in your home when dusk approaches.

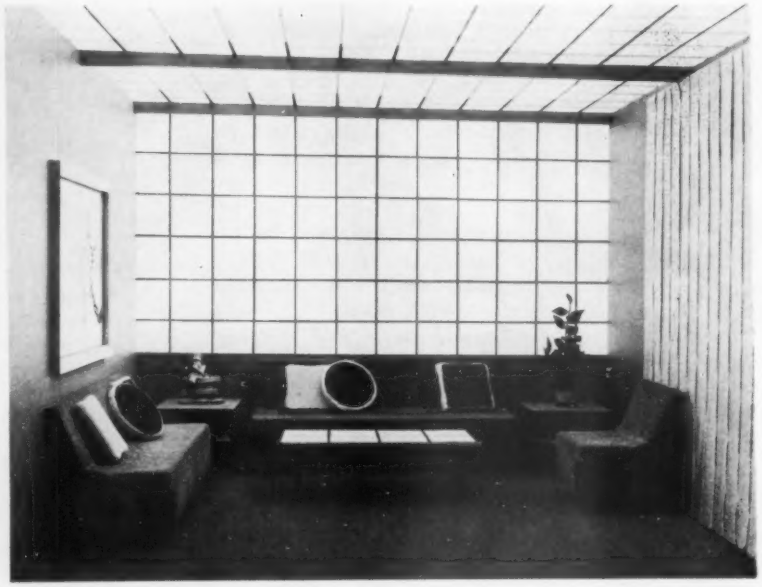
In their research in the field of electroluminescence, a method by which specially coated sheets of glass can be made to produce light, Westinghouse scientists are experimenting with producing transparent phosphors. This means that a phosphor can be sandwiched between two sheets of glass having an electrical conducting coating. During the day this glass would allow the daylight to come through and permit the viewer to look out (or in) in the customary manner. At night, however, electricity would be applied and the transparent phosphor would emit light.

According to Edward G. F. Arnott, director of research of the Westinghouse lamp division, the use of these transparent electroluminescent windows would provide the effect of having daylight twenty-four hours a day. Westinghouse is now producing electroluminescent panels (called Rayescent lamps) for commercial use. Mr. Arnott thinks that in about two years we will see their use becoming widespread. However, the transparent electroluminescent windows will have to wait for the 1960's, he said, before their use becomes practical.

Westinghouse has been experimenting with electroluminescent murals and walls of varying colors, tones and intensities and is already producing luminous dial plates for commercial applications. Color changing panels, no thicker than window glass, can be used to line and light an entire wall or ceiling, and to give off light equivalent to that in a modern well-lighted office. An area light source, electroluminescent lamps are basically a two dimensional source.

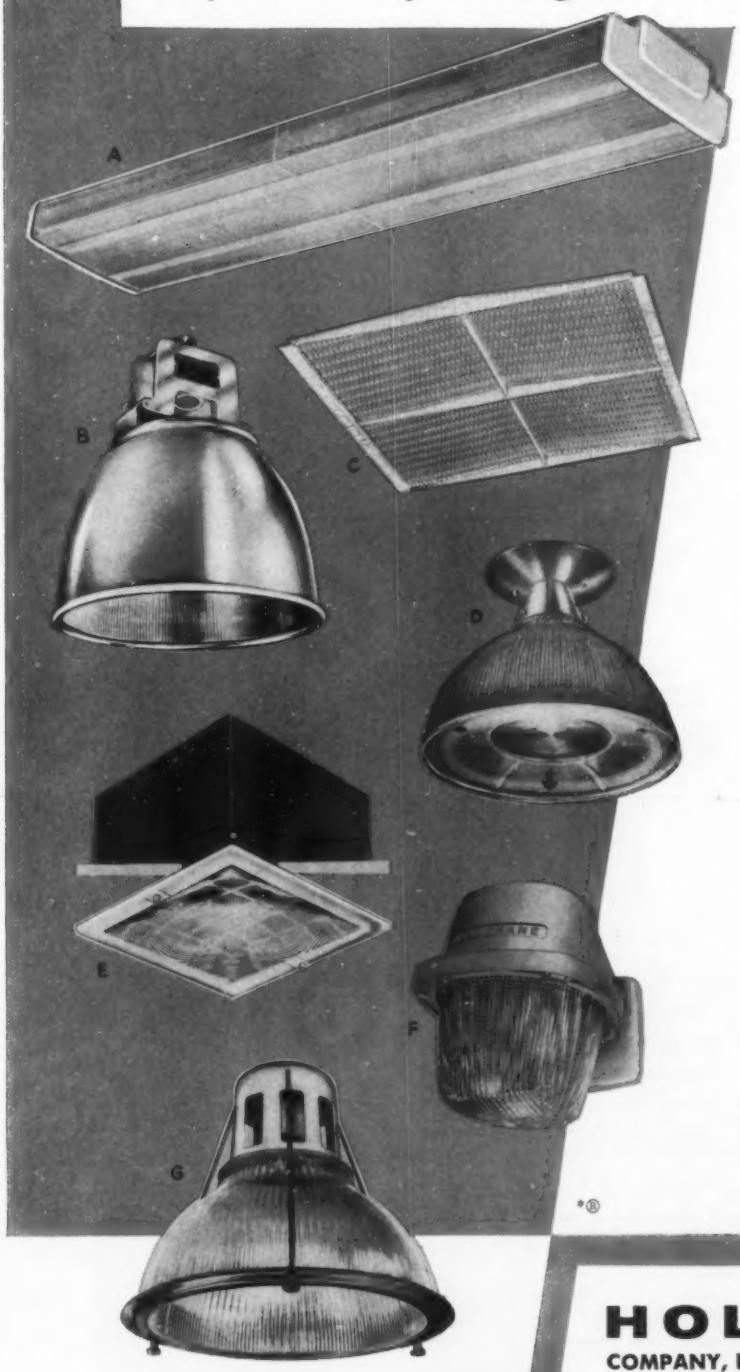
Electroluminescence, which was first discovered in 1936 by Georges Destriau, French scientist and Westinghouse lamp division consultant, produces light by phosphors coated on a metal or glass

(Continued on page 128)



The home of tomorrow may be lighted by windows at night as well as during the day. In the model room above, electroluminescent panels are used in windows, ceiling, coffee table and illuminated mural.

There's a **HOLOPHANE** Luminaire Specifically Designed for Each Purpose...



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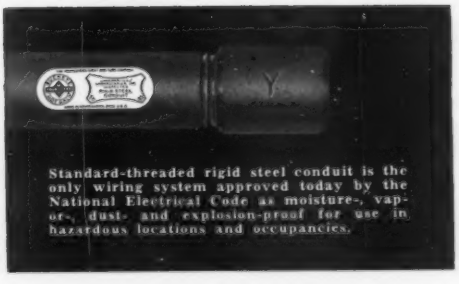

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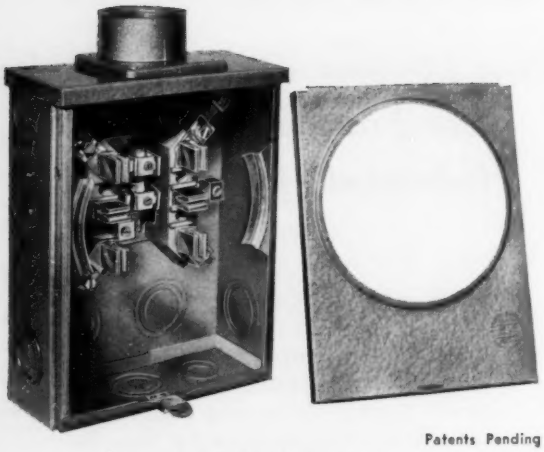

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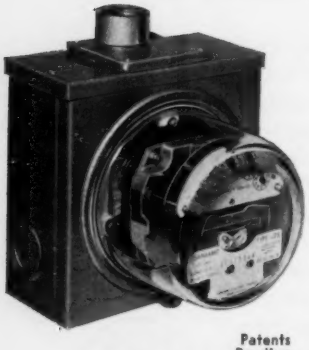

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Patents Pending

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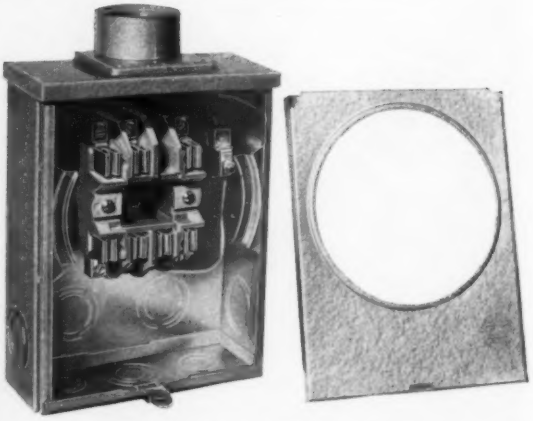
Size 10½" x 8" x 3⅝"
Up to 150 Amp. Capacity



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Size 10½" x 8" x 3⅝"
7-Terminals — 100 Amp. Capacity

No Sealing Ring required! New Snap Latch sealing device. Interchangeable conduit hubs, and many additional flexible features. Stainless steel sealing latch and stainless rivets eliminates electrolytic deposits. Unique hinge terminals, pressure plate design, 4/0 capacity—straight-thru single or 3 gang terminals—5th and 6th terminals—semi-automatic visible by-pass—and many other features. . . .

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Chrome, Copper or Brass
4 lights (60 W)
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4 lights (60 W) with on and off switch
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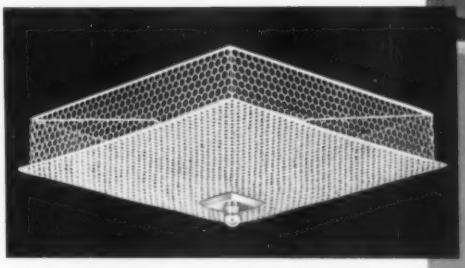
4 lights (60 W)
13" x 13" — Extends 4"
White acid etched glass with Black, White or Pink metal parts.

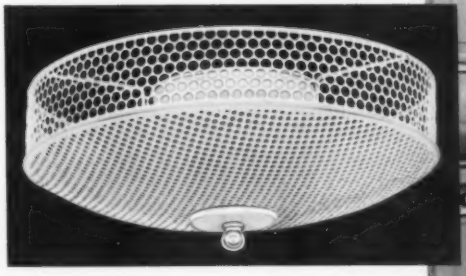
#1466
Chrome, Copper or Brass
4 lights (60 W)
13" x 13" — Extends 4"
White acid etched glass with Chrome, Copper or Brass metal parts.



#1165
Chrome, Copper or Brass
2 lights (60 W)
Diameter 11½" — Extends 4"
White acid etched glass with Chrome — Copper or Brass metal parts.

#1365
Black, White or Pink
4 lights (60 W)
Diameter 13½"
Extends 4"
White acid etched glass with Black, White or Pink metal parts.

#1366
Chrome, Copper or Brass
4 lights (60 W)
Diameter 13½" — Extends 4"
White acid etched glass with Chrome, Copper or Brass metal parts.



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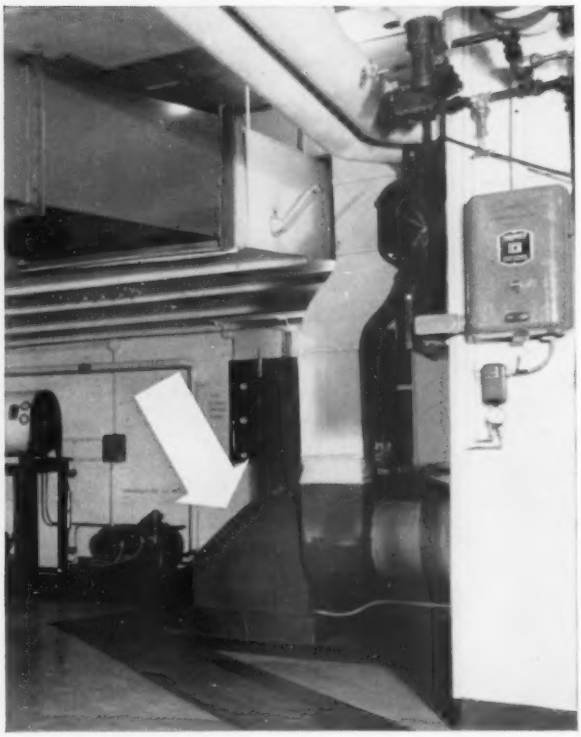
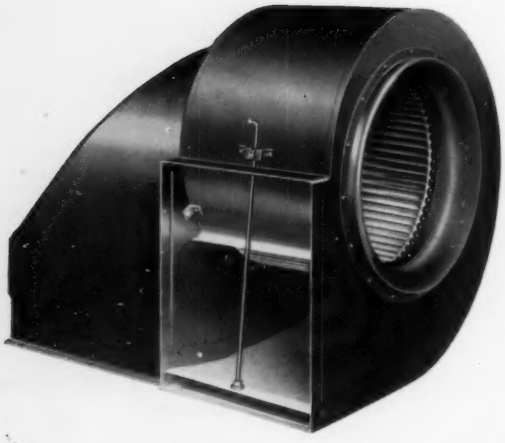


. . . here's the most versatile package unit that ever solved a ventilating problem!



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We call them utility sets because they handle such a wide variety of ventilating problems.

Self-contained, American Blower Utility Sets, in a wide range of sizes and capacities, are used to supply or exhaust air in a wide variety of applications requiring a duct system. That means from small-capacity driers, laboratory exhaust systems, to the supply and exhaust requirements in hard-to-reach areas of public buildings, apartments, schools, hospitals, or industrial plants.

As individual package units, they are easy to install, economical to operate. And they're engineered by American Blower—specialists in the design and manufacture of air-handling and air-conditioning equipment for over 75 years. Call our nearest branch office today for full information; or write: American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

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Now, more than ever, engineers specify: "CONDULETS*... or approved equal"

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TAPER TAPPING: Condulet threads are taper tapped to match tapered conduit threading . . . giving you a rigid joint that will not loosen . . . insuring *permanent* ground continuity!

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WEDGE NUT COVER FASTENER: This exclusive Crouse-Hinds feature is part of the cover itself. Screws can't fall out. No screw holes to locate. No protruding screw hole ears to damage cable.

LONGER HUBS: Conduit can be tightened completely without bottoming on integral bushing. And there's generous surface space for good wrench hold.

MATERIAL: Feraloy, a special alloy that is strong and tough, resists corrosion . . . gives sharp, full threads.

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Where else can you find all (or even *most*) of these features? You *can* find them all in each of the 45 types of Obround Condulets . . . sizes $\frac{1}{8}$" to 6".

There is a type for every need, including a wide selection of interchangeable covers and wiring devices. Just call your Crouse-Hinds distributor and ask for "Condulets!"

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Designed and developed "Compresto" (R) type covered aluminum wires for self-supporting service drop cables.

Produced more than three hundred million pounds of wire and cable over the past ten years with proven integrity in meeting delivery promises.

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Southern Electrical products can be sure
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Two leaders in the industry, now together
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• Small, light in weight, and easy to maintain.

The extensive experience of Delta-Star engineers in power and distribution equipment now brings you the latest developments in pole-type distribution transformers.

All new—from original concept to crating—Delta-Star Transformers incorporate every new improvement in transformer design. Included are a new core, a smaller coil, improved insulation, corrosion-resistant tank design, and a high-strength shipping crate.

Delta-Star Transformers, built to NEMA standards, are available in single-phase ratings from 3kva to 167kva, in standard voltages through 15,000v.

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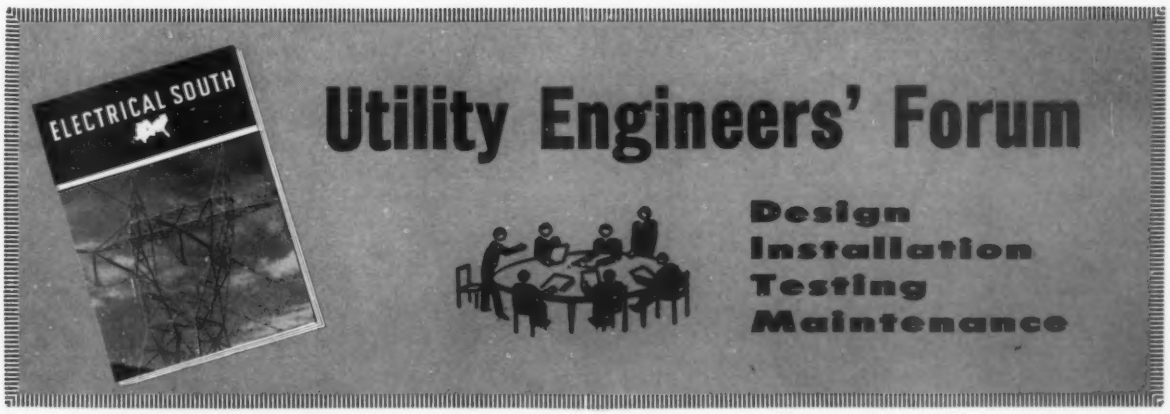
process a problem whenever it is convenient.

grammed, and tested, whether it be concerned with general account-

position of leadership it proclaims — it must be willing to take first



Exchange engineers meet in Atlanta

◆ INNOVATIONS in conference plans featured the recent meeting of the Engineering and Operations Section of the Southeastern Electric Exchange held in Atlanta. One was a reduction in time allowed for the general session attended by all groups, this being reduced to a single half-day session, permitting more time to be devoted to the separate committee conferences. Another change was the initiation of closed sessions, open to utility members only which provided opportunity for frank discussions of equipment as well as system design and operation.

Chairman Herman B. Wolf presided over the open general session which heard its first speaker, H. C. Leonard, executive vice-president, Gulf States Utilities Co., Baton Rouge, La., talk on "Life Line of a Public Utility," which dealt primarily with the public relation aspects of utility operations.

"In our day to day work," Mr. Leonard said, "including such things as securing and clearing rights-of-way, building new extensions, running services to new customers, installing meters, adjusting complaints, making our customers' bills, receiving his payments, and listening to his grievances, we are either building good will or missing opportunities by the thousands. In the recipe for good will, fair dealing is the principle ingredient. What we need, of course, for customer contact work and for that matter, for all our dealings with our fellow men, is good manners coupled with a lot of common sense. We need the ability to put ourselves in their places and imagine what we should do or say if the situation were reversed.

"The second phase of this paper dealing with supplying all of our employees with a good working understanding of the principles of the American System of Free Enterprise is far from simple. I might add that as our companies grow and as our employees become more specialized the task becomes still more difficult."

Research progress

"Current Research in Progress by Electric Utilities" was the topic of Howard P. Seelye, consultant to EEI Research Projects Committee. He discussed the nine current research projects in which EEI is taking part, including aluminum conductor fittings, high temperature steam generation, properties of metals, resusitation, electronic accounting machines, steam tables, soil thermal resistivity, strength of wood poles, and survey of electric utility research projects.

The latter survey indicated that sixteen companies were participating in atomic power group research only, 39 companies were participating in from one to five research projects of various natures, and 44 companies were participating in more than five projects (one company reporting as many as 143).

"The results of this survey," he said, "show that the electric utility industry as a whole is alive to its problems and is doing a large amount of research to solve them. Certain opportunities for economy and greater effectiveness by coordination of effort on matters of common interest are indicated. Also, there are certain subjects, particularly those dealing with the future handling of greater and greater concentrations of power, which should be undertaken.

"The Research Projects Committee is giving consideration to these matters although, at the moment, it cannot be said just what its future program will be. I understand that the Southeastern Electric Exchange is proposing to increase its activities in research, and it is to be commended for this. Whatever the future programs may be, I am sure that cooperation between the Exchange and EEI can be worked out for the elimination of duplication of effort and to the mutual advantage to both and to the benefit of the industry."

Computer use discussed

The application of digital computers to power system problems was discussed by L. John Rankine, of Data Processing Division, International Business Machines. After discussing the range of applications for data processing equipment in power system studies, Mr. Rankine summarized the advantages of digital computers as follows:

Singlecase availability in that digital equipment can be used to

process a problem whenever it is convenient.

Reduced engineering man-hours coupled with the fact that engineers need not necessarily be present during the set up and running of their problems.

Greater accuracy due to the capacity to handle ten or more digits and to perform floating point arithmetic.

Immediate availability of printed results and permanent records.

Elimination of error by reducing the human element required both in processing the problem and in transcribing the results.

Capacity to study ever increasing systems which may eventually outgrow the capabilities of analog devices.

Logical ability to make decisions on the basis of computed results and to perform such operations as table look up, etc.

Increased economy — the economic advantage has been quoted at four to one and manpower conversation at twenty to one.

Speaking on the educational requirements and training facilities needed to apply digital computers advantageously to power system problems, he said:

"In view of the versatility of present day data processing equipment, it follows that every engineer should have at least a speaking acquaintance with the range of equipment available right from punched cards through the basic machines, to the largest and latest general purpose digital computers such as the IBM 705 and 709. Knowledge of this type can be acquired through one day seminars or orientation courses conducted specifically for utility engineers running from one to two weeks. Equipped with this knowledge, the engineer is then more able to judge his problem in the light of the equipment he has available and to pick the tool best suited to his needs.

Secondly, there should be a smaller representative core of engineers more closely familiar with the mathematical statement of problems, their representation in flow chart form, and the language of the machine that is going to solve them.

"Then there are those directly concerned with the data processing machines themselves and these persons must be thoroughly schooled in their programming and operation. This third group need not necessarily be engineers — once a problem is designed, programmed, and tested, whether it be concerned with general accounting or engineering, then the remaining essential is that it be machine processed under competent personnel who have the necessary aptitudes whatever their background may be — college or high school, commercial or scientific.

"Last and foremost, top management must have the broad general picture of the entire range of data processing equipment available and the potentialities of every unit in this range when viewed from every aspect of the business."

Status of atomic power

The general session was concluded with a detailed analysis of the present status of nuclear power and its future prospects presented by O. B. Falls, Jr., manager of marketing, Atomic Power Equipment Dept., General Electric Co.

"From where we view the domestic market today," he concluded, "we feel certain that within the next eight years total over-all costs, including research and development for nuclear plants of the Dresden Station size in the United States, will be reduced by approximately 50%. It is also predicted that we will see a 35% reduction in nuclear fuel costs as well, which will mean that possibly as early as 1970 we in America should be producing electricity from the atom at below cost of conventional power generation in some areas.

"However, this will not come about without the continued electric utility industry leadership of the past being brought to focus on the development problems of today. . . The utilities must recognize that there are two ways to progress the art. One is to encourage and undertake study and investigations of new and novel types of reactors to determine if there is some better one to follow. The other is to pick one or two types and make it possible for several successive generations of this system to be built so that the experience-improvement factor is given a chance to make a contribution.

"In reference to the first approach — a realistic look at the industry position today has caused us to take another look at the tremendous task ahead in research and development. We find that all technology cannot come from the government laboratories, and if private enterprise is to assume the position of leadership it proclaims — it must be willing to take first of a series of several steps down the road to the successful development of a plant concept. This is the step of being willing to sponsor research and development programs!"

J. J. McDonough, president, Georgia Power Co., was the featured speaker at the luncheon meeting. He discussed the importance of public relations in utility operations and pointed out the areas in which engineering and operation executives would best further their companies' interests in this respect. George Kinsman, vice-president, Florida Power and Light Co., presided over the luncheon meeting.

Distribution conference

Trends in meter testing were discussed by C. E. Lancaster, general meter superintendent, Georgia Power Co. After reviewing some of the things that have been done to improve meter life and accuracy such as changing out magnets to new type which resist weakening from lighting surges, and replacing all lower bearings on meters that come through the shop, Mr. Lancaster reported that results were such that meters no longer are tested every time they come into the shop. Meters are now tested on a six year schedule; a meter coming into the shop in clean condition with a test seal not over five years old is sent out to be reset without test.

A paper by H. E. Campbell, of GE's Engineering Planning and Development Section, on "Economic and Technical Considerations in Serving Heat Pump and Air Conditioning Loads," was presented by J. C. Hartley in Mr. Campbell's absence.

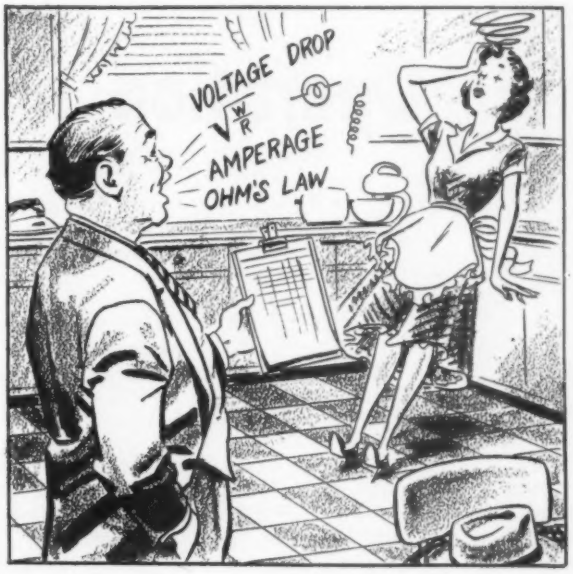
"Present system design practices can be used to design economical systems for supplying heat pump and air conditioning loads," the speaker concluded. "Admittedly, systems will have to be expanded considerably for these loads but that is the way load growth has been taken care of since the inception of the electrical industry."

15 kv feeders of future

A study of the use of feeder ties in connection with 15 kv class feeder design of the future was presented by J. W. Beville, Jr., assistant to system engineer, Florida Power and Light Co. After dis-

(Continued on page 124)

Are you selling the steak or the "sizzle"?



Sure, you know all about "voltage drop" and "overloading"—and how a house should really be wired for best performance.

But how about the little lady? Chances are all she knows about electricity is that it packs a wallop. That's why she usually lets her husband change the fuses.

One thing she knows for sure, though—nothing works right anymore. The appliances act sluggish, the lights go dim, and the fuses keep blowing. That's why she's called you in.

She's been reading all about the wonders of "FULL HOUSE-POWER" and "LIVING BETTER...ELECTRICALLY"—and she wants some of the same.

This is no time to talk about "voltage-drop."

Avoid Technical Jargon

Your trade associates will know what you're talking about—but she won't. Take a tip from industry promotions now educating the public: *talk to your homeowner customers in terms of the pleasure, convenience and safety of an adequately wired home.*

Stress the enjoyment and comfort offered by the latest electrical appliances and the need for having the proper wiring to enjoy it. Your customers will respond a lot faster to these benefits—the "sizzle"—than they will to talk about amperages and voltages.

And when you explain the wiring details, try putting it in simple terms. For example, when you show how conductors feed current into branch circuits, you might use the idea of "water in a big pipe feeding into smaller pipes." Homeowners can understand that kind of talk and they'll be considerably more receptive to your sales efforts.

What Other Contractors Are Doing

Contractors who sell rewiring find they can better escape the cutthroat competition of new construction work and bid-peddling. To help them along, the industry is spending over $10 million this year to promote rewiring jobs.

Make this investment pay off for you. Tie in locally with the national wiring programs sponsored by the industry. Cooperate with trade allies. Do a little promoting on your own by advertising locally or in direct mail.

And above all, sell "better electrical living" every chance you get: through trade and civic associations, through employees—yes, even through friends and relatives.

Every one in the industry has a stake in the multi-billion dollar modernization market—yours, the contractor's, is perhaps the biggest.

Published in the interests of the Electrical Industry. Reprints of this message are available by writing to Dept. ESD at:

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HOUSEPOWER

LIVE BETTER ELECTRICALLY

OPERATION Better Your Living HOME IMPROVEMENT

FOR A HAPPIER AMERICA AT HOME

Operation and maintenance of

By T. W. Tillman
District Superintendent
Georgia Power Company
Columbus, Ga.

◆ HOW MANY TIMES have you operating men heard the report that one of your distribution substations was overloaded? The one where the capacity was doubled only two years ago? What to do now? One standard answer throughout the country is "convert the fringe areas to 7.2 kv."

Most all of the distribution systems in Georgia were built to operate at 2.4 kv delta and as the load gradually grew, it was necessary to convert to 4 kv wye. This was done without much expense or trouble and usually the same soft drawn #6 wp wire primary was used on the 4 kv system.

Most of this wire had been resagged a number of times and each time the wire was made smaller, so that now some of the #6 is no larger than #10. This would operate at 4 kv fairly well, and as 4 kv can be worked with rubber gloves, the wire could be replaced hot, without an interruption to service.

When converting to 7.2 kv wye the picture changes. Most of our new distribution is being built at 7.2 kv and is built with proper size new wire, pole heights, and clearances. The sections where 4 kv is converted to 7.2 is where our greatest operation hazards lie.

Lets look into this: Where converting small wire to 7.2 kv you find: (1.) Mechanical strength of the wire makes hot stick work very hazardous. (2.) Faults at this voltage will burn down the small wire because of increase in short circuit current. (3.) Circuits in most cases must be interrupted to replace conductors.

To avoid these problems we must have more sources of power and many sectionalizing points. This will minimize both planned and other outages, so as to inconvenience the minimum number of customers. Pole-type reclosers and regulators are a necessity and must be installed where needed.

In some companies the Engineering Department plans the conversion, the Construction Department does the job, while the local Operating Department has to operate and maintain what is given to them. This sometimes puts the Operating Department behind the "eight-ball."

The Engineering Department, in planning the job, usually trys to

At left, hotline rig is used in changing middle insulator. Fiber line guards are used instead of rubber goods on 7200 volt installations. At right, outside insulator is being replaced.

7200 volt lines

spend as little as possible to handle the present loads. The Construction Department wants to get the job done and move on. The local Operating Department must live with this system and the public it serves and by all means they should have some say so as to how the system should be built.

Poles are backbone of system

No system is stronger than its mechanical strength, and creosoted pine poles and cross arms are the back-bone of such a system. A creosoted pine pole can look perfectly good and yet be completely rotted off below ground line. There are many ways to inspect poles, choose one to your liking that does not damage the pole. A very good method is to strike the pole with a hammer. If the outside portion is decayed the hammer will go through and if the pole is hollow, you can tell by the sound. The most important thing is to be sure to change out the bad poles when they are found.

Proper pole height is another very important item in the planning of 7.2 kv systems. 40 ft. poles should be the minimum height used (except on rural taps) and 45 ft. or higher should be installed on transformer and corner poles and above all, the class pole should be adequate to take heavy loading where necessary.

There is very little maintenance which can be made on conductors once they are installed, except to stress the importance of clearances involving trees, telephone wires, streets and to be sure the wire is not too soft or too small to do the job.

One of the most important and most abused items on most systems is the distribution transformer. They cannot be properly maintained in the field and every transformer that is removed from the line is run through shop before being reinstalled.

Shop procedure is as follows: (1.) Oil changed and tanks cleaned inside and out. (2.) Hi-pot test (two times rated voltage plus 10 per cent). (3.) Ratio test. (4.) Bushings and connections examined. (5.) Tanks painted.

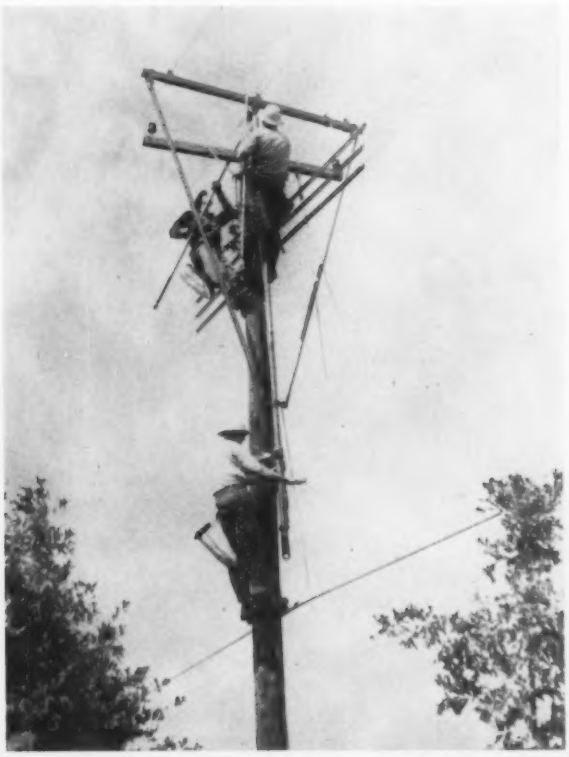
All oil removed from transformer is reclaimed.

Arrestors protect switches

We have many tie switches which normally operate in the open position. These open switches used to give quite a bit of trouble because of lighting. We have overcome this difficulty by installing lightning arresters one span in each direction from the switch and driving deep grounds at each location to insure low resistance. These grounds must have less than ten ohms resistance.

Our results from these practices have been very gratifying. We

(Continued on page 76)



To remove old crossarm, this hot line rig uses false crossarm to raise all three wires at one time. At right is a typical 100-ampere pole-type oil recloser installation protected by lightning arrestors.

Capacitor control scheme

By S. H. Pollock
Principal Engineer
Kansas City Power & Light Co.
Kansas City, Mo.

◆ A 3600 KVA CAPACITOR bank, installed in a substation supplying an industrial district, presented several switching problems.

As shown in Figure 1, the substation source was a 33 kv line, fed from a 115 kv line. The 33 kv line also fed three other distribution substations, which served a large residential area. All the substation transformers had voltage regulation, but because of the length and voltage variations in the primary system, voltage conditions were critical.

It was found that the capacitor could be operated whenever the industrial load was on, that is, from 8 a.m. to 4:30 p.m. on week days. At night and over week-ends, however, the capacitor would produce too high a voltage on Substation #81 supplying the industrial load. The Substation #81 transformer had a high impedance and, even with the fixed taps at their lowest, the tap changer would run to full buck when the 3600 kva capacitor was connected to the 7500 kva transformer during light loads.

On hot days and evenings, however, we need all possible capacitors connected to help out on our generation and transmission systems. A check showed that on hot evenings the 3600 kva capacitor could be left connected to Substation #81 until 10 p.m. without causing too high a voltage. From this set of conditions the control scheme shown in Figure 2 was evolved.

This control scheme consists of a time clock, set to come on at 8 a.m. and go off at 10 p.m., with Saturdays and Sundays plugged out so the capacitor never comes on during week-ends. In series with the time clock is a thermostat, set

(Continued on page 68)

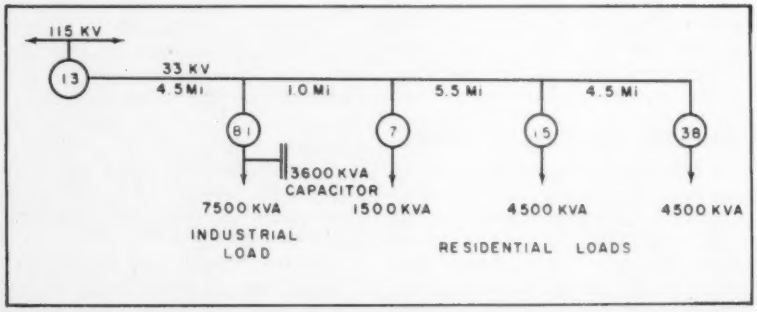


Fig. 1. Substation #81 source is a 33 kv line, fed from a 115 kv line, which also feeds three other distribution substations serving a large residential area.

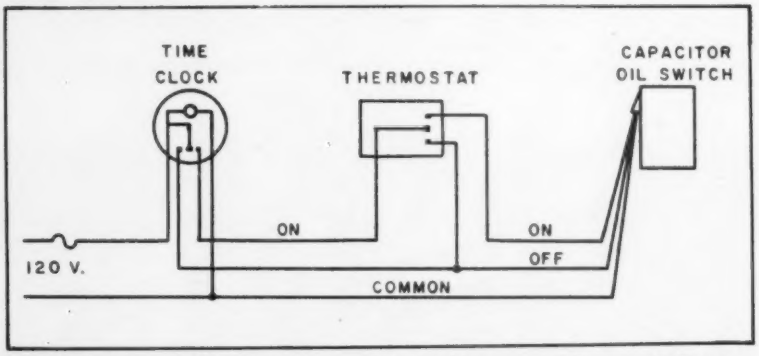
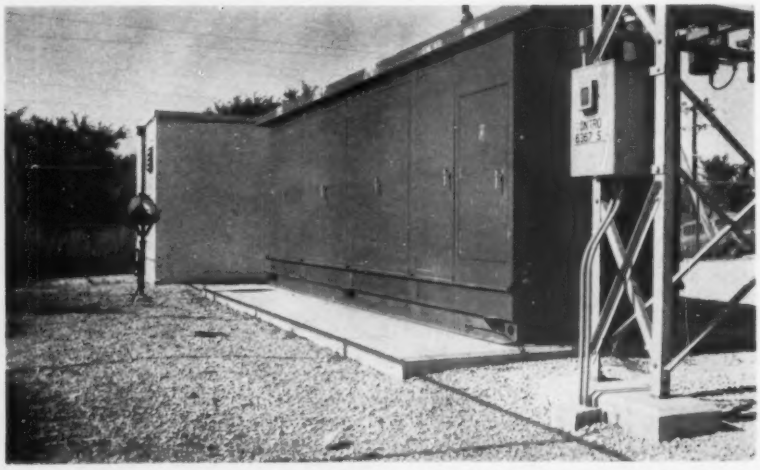


Fig. 2. This somewhat ingenious control scheme was hit upon following careful analysis of the time and temperature conditions involved in Substation #81's load and voltage problems.



An ordinary farm-type thermostat used in dairy barns, etc., has been adapted to control this 3,600 kva substation type capacitor bank.

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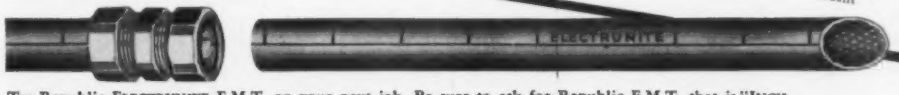

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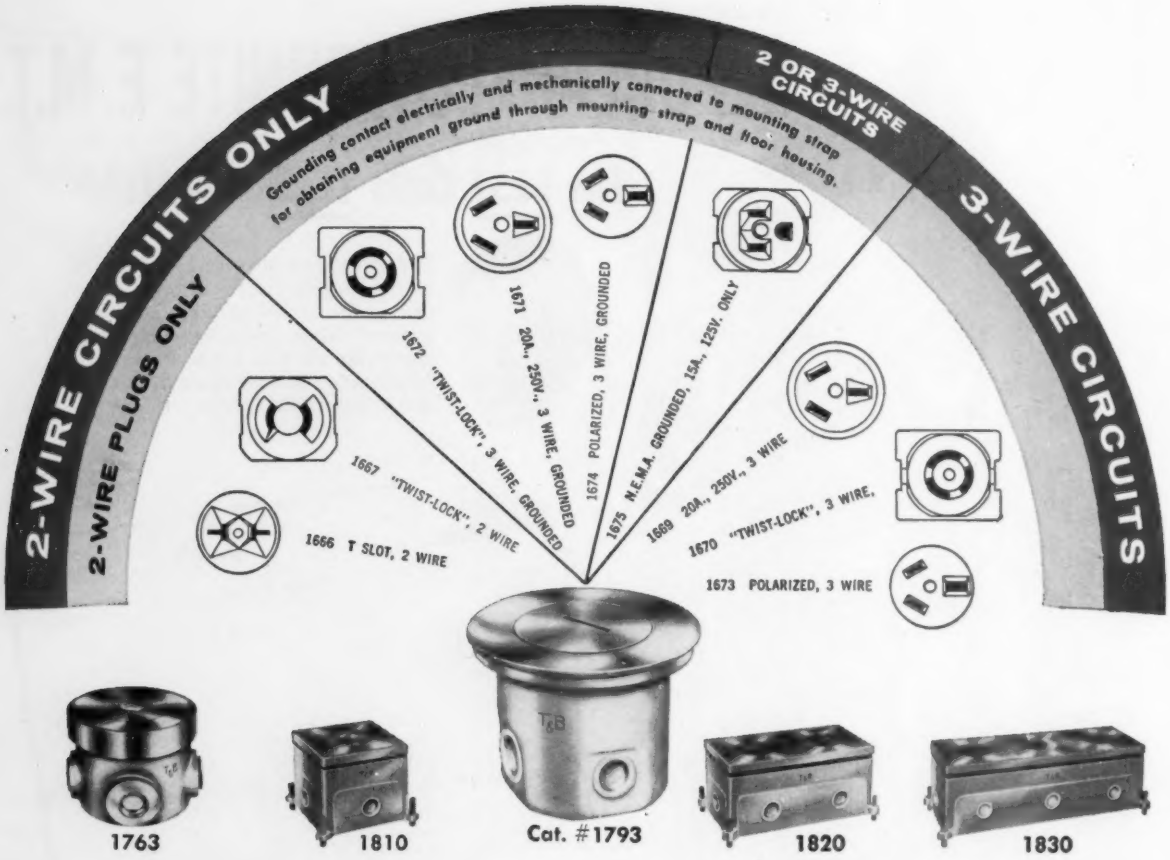
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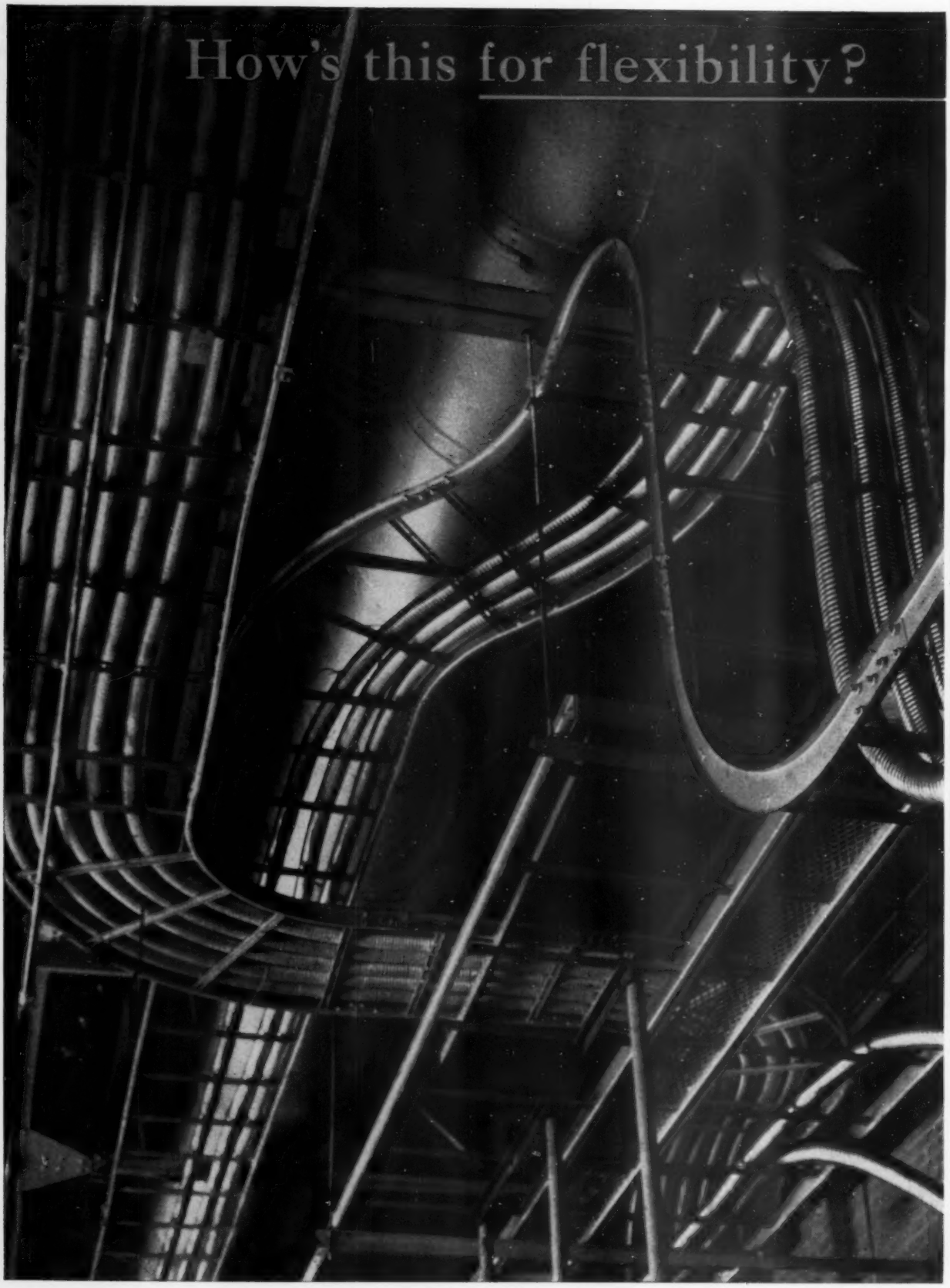
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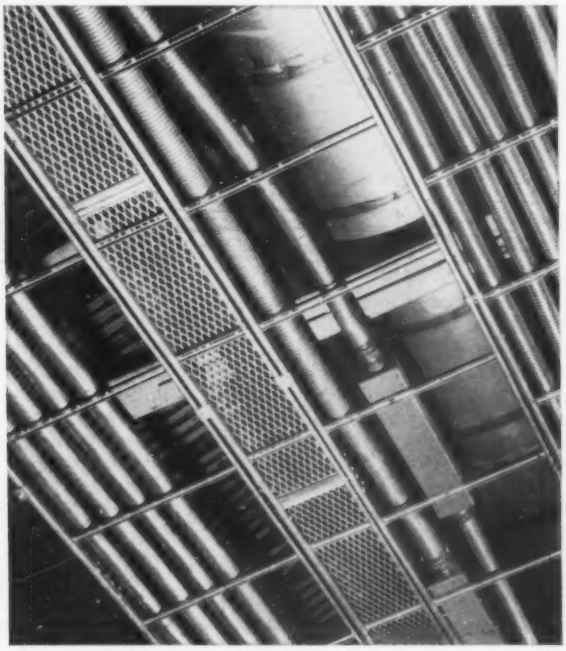

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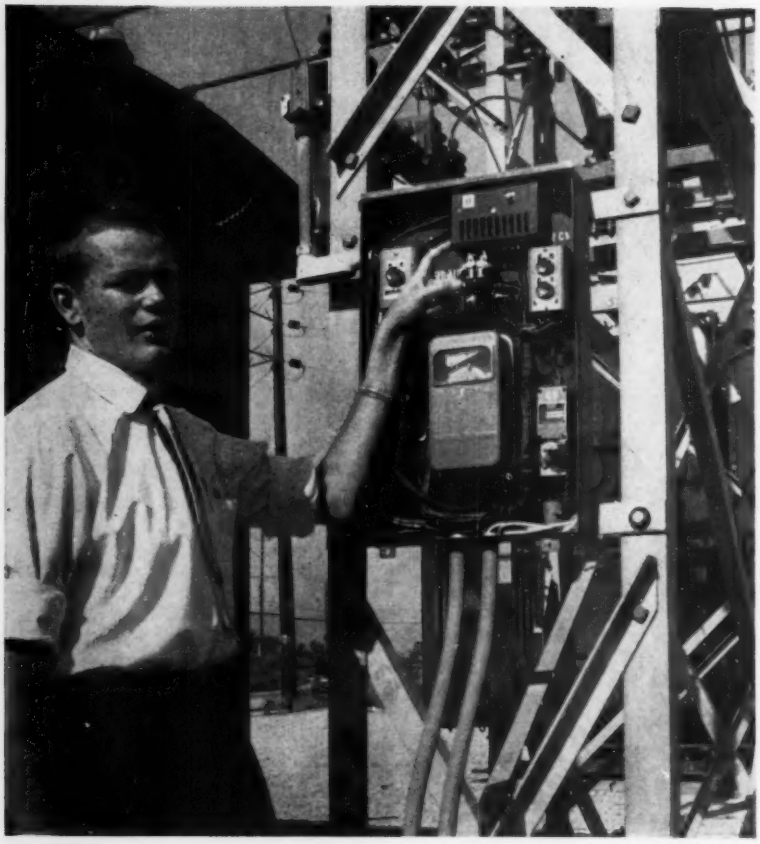


Arrangement of devices within the control box is shown here. The unit is mounted so as to catch the morning sun assuring operation during daytime industrial loads. On warm evenings, capacitors stay on, too.

to come on at 90°F. They are connected so that when both the time clock and thermostat call for the capacitor, it comes on. Either of them will shut the capacitor off independent of the other, however.

The plan has worked quite satisfactorily. The thermostat was placed on the east to catch the morning sun, so the capacitor is on for the industrial load. Then, on warm evenings, it stays on; but on cool evenings, it drops off before it can cause any high voltage. The time clock shuts it off for the late night hours and on week-ends, so that high voltage does not occur.

The thermostat is a farm-type, generally used for controlling fans in barns. The contacts are heavy enough to handle the oil switch current directly without auxiliary relays, yet small enough so we can mount it in our existing control cabinet, along with the time clock and other relays.

New silicon sheet material hikes transformer performance

◆ "FOUR-SQUARE" silicon iron—a new kind of sheet material designed to increase the efficiency of transformers, motors and generators—has been developed at the General Electric Research Laboratory.

The new doubly-oriented magnetic sheet material, which is easily magnetized in four directions and can be made in a wide range of useful thicknesses, has been produced by theoretical metallurgists working side-by-side with processing experts in the metals and ceramics laboratory.

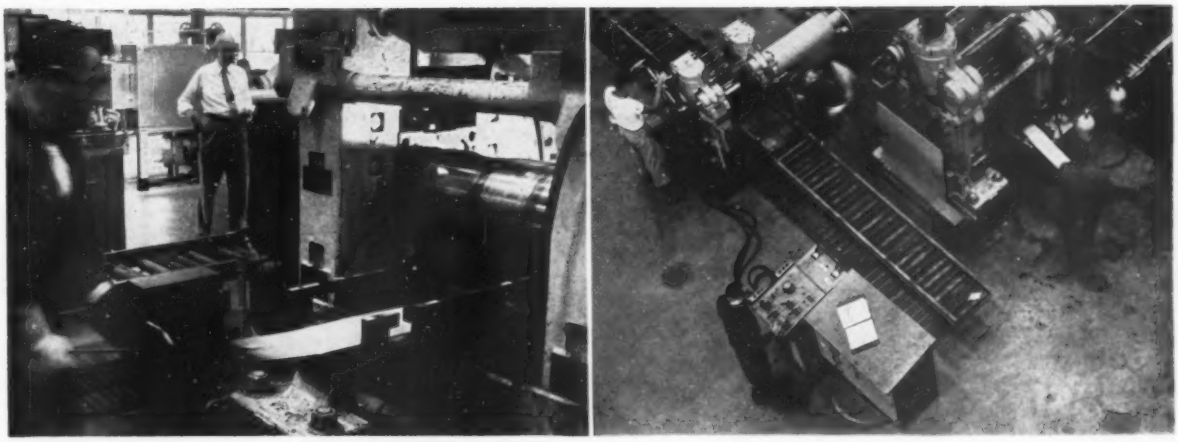
Lower energy losses and reduced noise in many types of electrical equipment can be expected when "four-square" silicon iron gets into actual production, according to Dr. Guy Suits, GE vice-president and director of research.

"Four-square" magnetic sheet began with the coalition of ideas in the minds of research metallurgists J. L. Walter and Dr. W. R. Hibbard, Jr., manager of alloy studies at the Research Laboratory. Since their early experiments demonstrating the feasibility of the process, nearly a dozen other scientists and metallurgical engineers have contributed to the development and evaluation of the material.

Doubly-oriented magnetic sheet has been a research goal for more than 20 years, ever since metallurgists learned how to make singly-oriented sheet materials that can be easily magnetized in two directions (back and forth lengthwise along the sheet). "Orientation" in silicon iron is achieved by aligning the individual chrystalline grains in the finished sheet material. The doubly-oriented "four-square" effect is produced by a different kind of alignment (technically referred to as "cube texture") which gives excellent magnetic properties not only back and forth along the sheet but also back and forth across the sheet.

Rigid control of the internal structure of the metal during all steps of processing, from the original casting through successive heat-treating and rolling-mill operations, is the secret of the "four-square" process. The basic raw material is a form of silicon iron similar in composition—and cost—to the typical kinds of "soft" magnetic sheet used in modern transformers and motors.

The iron core in a transformer serves as a conductor of magnetic lines of force, guiding them from the primary winding coil to the secondary winding coil. When ordinary 60-cycle alternating current is used, the direction of magnetization changes 120 times every second. The core's resistance to these changes causes a loss of energy—and reduced efficiency



Teamwork and proper timing of processing steps are essential in preparing GE's "four-square" silicon iron. A metal processor, above left, works quickly to reduce material's thickness to that required for use in laminated cores of transformers, motors, and generators. At right, a scientist checks time.

through the generation of heat, and also causes actual mechanical vibrations in the core which result in annoying "transformer noise."

Ordinary iron was used in the earliest transformers, and the advantages of increasing efficiency by adding a small percentage of silicon was discovered near the turn of the century. In the 1930's William E. Ruder and other metallurgists helped show that special rolling and heat-treating techniques would produce sheets of singly-oriented material that could be easily magnetized in two directions. By appropriately lining up the sheet in a transformer, generator or motor, most—but not all—of the magnetic flux could be carried in these "easy" directions. This discovery has had a significant impact on the technology and economics of electrical apparatus. The currently-used product has reduced transformer core losses to a tenth of the original unalloyed iron and a fifth of those of the original silicon-iron alloy. "Four-square" sheet promises even further improvements in efficiency.

In one familiar type of transformer core construction, the advantages of singly-oriented materials can be realized on three sides of the square, although even with this configuration there is still considerable loss at the corners (See Figure 1).

With "four-square" magnetic sheet, a variety of construction arrangements are possible which take advantage of the easy magnetization on all four sides. The new material also gives a substantial reduction in corner losses (See Figure 2).

Dr. J. Herbert Hollomon, manager of GE's metallurgy and ceramics research, has compared ease of magnetization with ease of travel in a mountainous country.

"Ordinary iron is like a country with no roads," he pointed out. "The invention of singly-oriented sheet was like giving us wonderful new superhighways—but they all ran north and south. Now, with 'four-square' magnetic sheet we have fine highways going both north-south and east-west."

"Four-square" magnetic sheet is currently in pilot-plant production. How soon it will be used in transformers and motors depends on "progress in making the new process economic," according to GE officials.

Dr. Hollomon believes that "four-square" sheet can eventually be produced at approximately the same cost as presently-used materials, but as with all such discoveries there must be a period of advanced development and evaluation before the expected benefits can be incorporated in actual products.

"We cannot, at this time, predict how soon 'four-square' sheet will be produced in quantity. However, a material long desired by design engineers has now been produced successfully in the laboratory, and the results are certain to find their place in improved products," he said.

All steps in the development and pilot-plant manufacture of "four-square" magnetic sheet have been performed in the GE Research Laboratory's metals and ceramics building. This huge factory-like

(Continued on page 76)

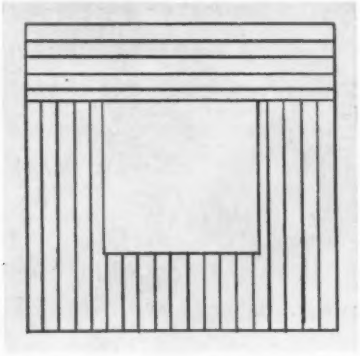


Fig. 1. This transformer core construction allows singly-oriented material on the square's three sides only, with much loss at each corner.

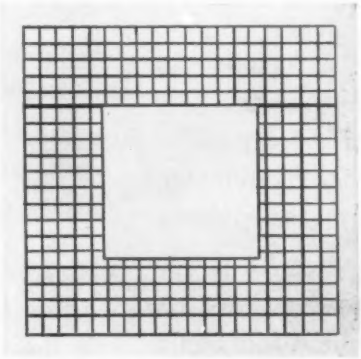
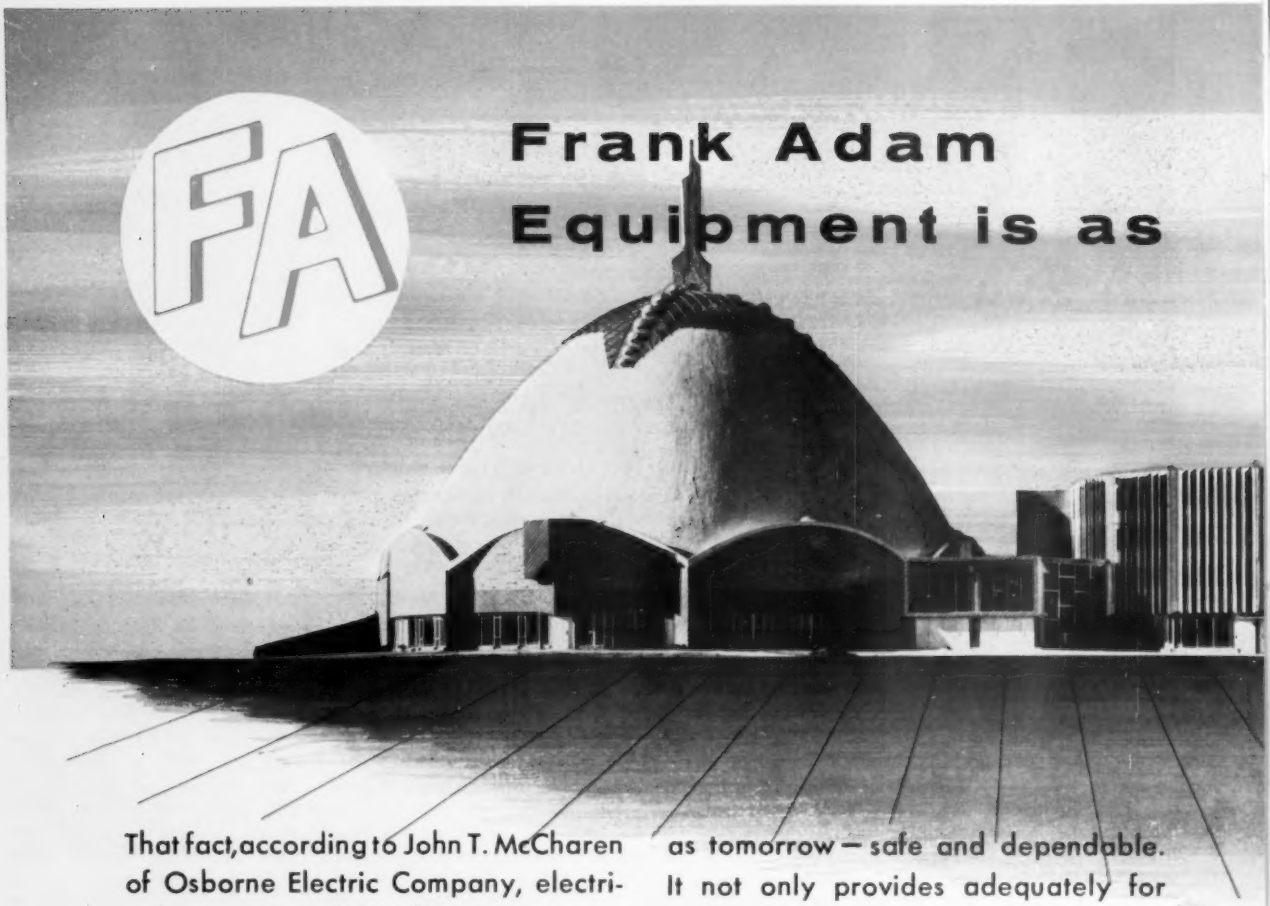


Fig. 2. Many construction arrangements are possible with new "four-square" magnetic sheet, which provides magnetization on four sides and essentially reduces corner loss.



That fact, according to John T. McCharen of Osborne Electric Company, electrical contractors of Oklahoma City, is one of the big reasons why Frank Adam Equipment was selected for installation in the First Christian Church of Oklahoma City, more popularly known as the Church of Tomorrow.

"The designers of the Church of tomorrow," Mr. McCharen said, "wanted an electrical distribution system that was modern in design, expertly engineered, and would give long-lasting and trouble free service—equipment that would blend with the general design of the Church.

"And that is exactly what they got when they installed Frank Adam Equipment for the control and distribution of power and light.

"Frank Adam Equipment is as modern as tomorrow—safe and dependable. It not only provides adequately for today's electrical needs, but it anticipates future demands and allows for it.

"That we think, is extremely important. It means that the user will not be confronted with the problem of making extensive changes in his electrical system to provide for increased power demands. With Frank Adam Equipment changes in capacities, additions of new circuits and new equipment is simple and easy. That's why we like Frank Adam Equipment.

Mr. McCharen is absolutely right. Frank Adam Equipment is built with an eye to the future. Assure your customers adequate capacity for today and tomorrow. Recommend Frank Adam products.

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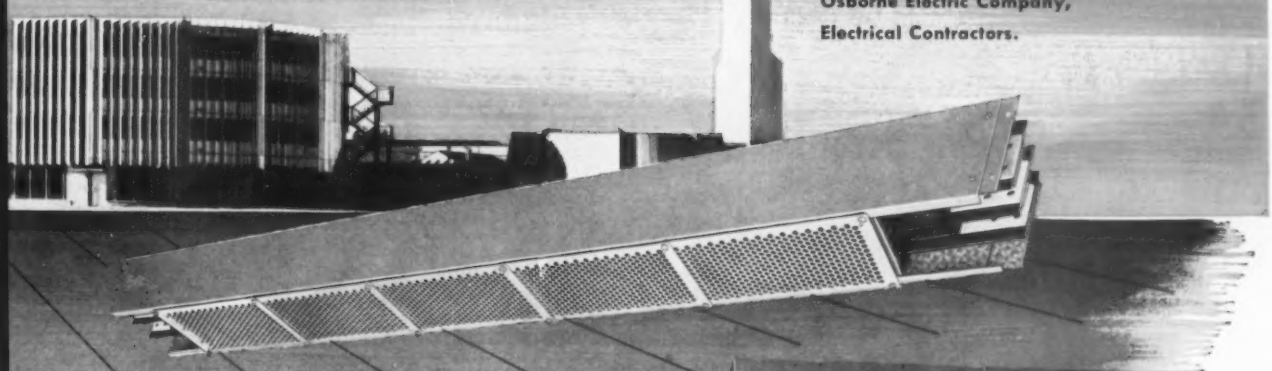

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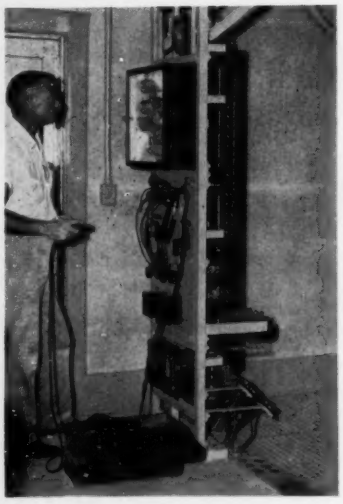

Understanding vectors as applied to apparatus connections

By E. B. Henry
Relay Engineer, Gulf Power Company
Pensacola, Fla.

Part 1

◆ THIS SERIES of articles is composed of three parts, discussing transformers, meters, and relays, respectively.

It is the outcome of various efforts to clarify, especially for newcomers to the field, the relation of vector diagrams to electrical connections. It will, therefore, be an old story to many readers but there may be a few points that will aid in the expositions that all are called upon to make in their own organizations.

To minimize repetition, several positions are stated here:

(1) A three phase, sixty cycle system is assumed as a basis.

(2) Transformer losses and inherent errors of ratio and phase angle are ignored.

(3) Unity power factor is to be assumed in illustrations except as noted.

(4) References to current direction are to be taken in the conventional sense.

I—Transformers

In a discussion of alternating current connections, it seems logical to begin with transformers, since correct connections of other equipment can hardly be ascertained without reference to transformer connections. This requires an understanding of "polarity" as applied to transformer terminals.

Terminal markings

The term "polarity" as applied to a d-c source requires no reference in that it is assumed to be such as to produce a current flow from positive to negative in the external circuit. The term applied to an a-c source or piece of equipment is relative both as to time and direction, and must therefore be referred to some other source or terminal whether totally independent or magnetically or electrically coupled. The term "polarity" applied to a transformer refers to high side and low side terminals of the same polarity.

The two most used methods of indicating transformer terminals of the same polarity are:

(1) To show a diagram or plan of the transformer on the nameplate with the high side terminals marked H1 and H2 and the low side terminals marked X1 and X2; H1 and X1 have the same polarity; H2 and X2 have the same polarity.

(2) To show a mark, usually a white spot, on or near one high side terminal and the same mark on or near the low side terminal of the same polarity; the two unmarked leads, of course, are also terminals of the same polarity with respect to each other. The first method indicates that internal leads from the windings are connected to the external terminals in such a manner that as input voltage tends to cause current to flow into the H1 terminal, output voltage tends to cause current to flow out of the X1 terminal, the incoming current and the outgoing current being at the same points on the sine wave; the polarity, with respect to the external circuit, is as though the transformer were not there and the lead supplied directly from the primary source. In this respect, the physical arrangement of the terminals makes no difference.

To some there may seem to be a discrepancy here since one winding of the transformer receives as the other puts out and yet we say that the two terminals, H1 and X1 have the same polarity. This fact may appear more logical if one mentally superimposes a third winding to receive the input voltage and, in this way, place the real windings and terminals on the same basis of comparison. H1 and X1 can now put out, into external circuits, sine waves that are at the same point at every instant of every cycle; if the voltage is the same they can be connected in parallel.

Phase sequence

The term phase sequence (or "phase rotation") refers to the order in which the sine waves of voltage and current occur in a given system of conductors. The standard for three phase systems in general is to have conductors so designated that the sine waves reach their maximum values in an ascending numerical or alphabetical order as 1, 2, 3 or A, B, C. Of course all like points on the waves follow in the same order. Maximum values are being used as convenient reference points. With a given set of three quantities only two sequences are possible. In the examples that follow

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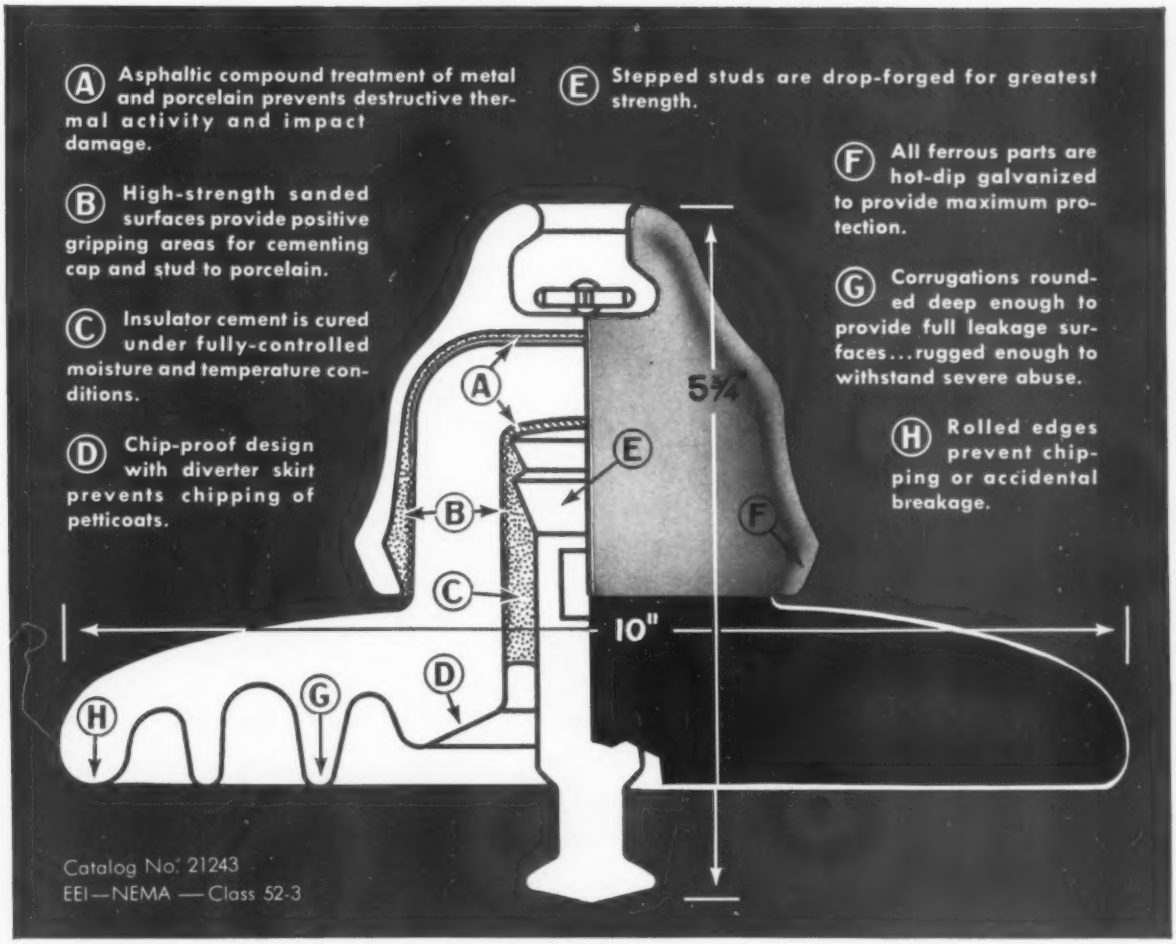
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the phase sequence will be understood to be A, B, C. If the phase sequence of your system is 3, 2, 1, you have only to consider the 3 as A, the 2 as B and the 1 as C.

Vector rotation

The mathematical quadrants are formed by two lines, one horizontal and one vertical, intersecting at a point called the origin. The quadrant above the horizontal and to the right of the vertical line is Quadrant I. Quadrant II is to the left of Quadrant I. Quadrant III is under Quadrant II. Quadrant IV is to the right of Quadrant III which completes the 360 degrees. The mathematical quadrants are considered as fixed. Lines and points revolving about the origin pass through them.

Standard positive sequence vector rotation is in ascending order of the mathematical quadrants, or counter clockwise. Thus with a phase sequence of 1, 2, 3, the three 120° vectors are to be so designated that if the whole system of vectors revolved counter clockwise, the numerals would pass a given point in that order; if the phase sequence is 3, 2, 1, the vectors are to be so designated, that if the whole system of vectors revolved counter clockwise, the numerals would pass a given point in the order 3, 2, 1. It follows that the occasionally heard terms "clock-wise system" or "counter clockwise system," applied to the order in which the waves of voltage and current occur in designated conductors, are of doubtful meaning.

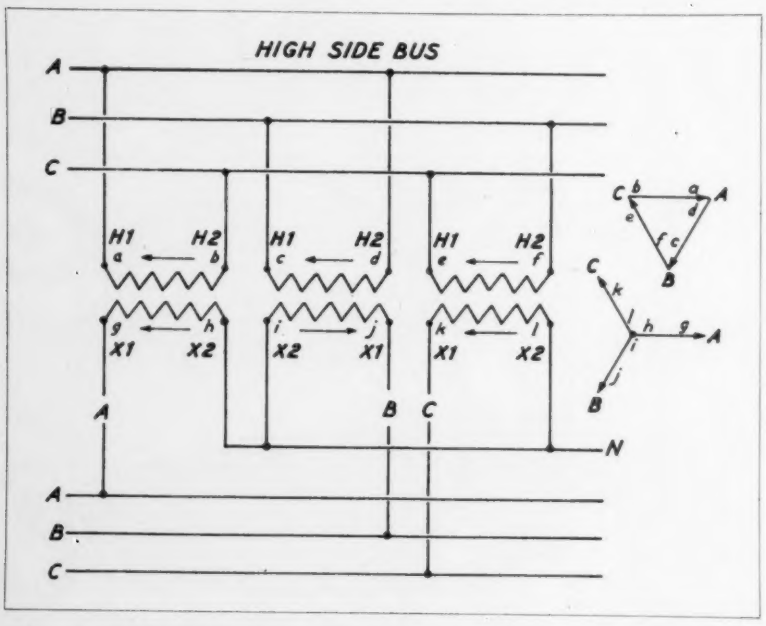


Fig. 1—Delta-wye transformer connections for 30 degree high side lead.

Wye-delta and delta-wye transformer connections

In the case of a standard three phase transformer or transformer bank, the high side is given first place in the designation; it also leads the low side by 30 degrees. This is true of a standard connection regardless of phase sequence or terminal markings. But it is not to be assumed that all three phase transformer connections conform. Sometimes there are good reasons for departure while at other times there are departures by choice where either would serve the purpose. In the usual departure from the standard, the low side leads the high side by 30 degrees.

Sometimes it makes no difference whether the 30 degree displacement results in the high side leading, or vice versa, so long as the phase sequence remains the same as that of the feeders formerly supplying the same area. However, throughout this discourse it will be assumed that a specified phase relation between high and low must be maintained.

In the delta-wye example of Fig. 1 it is assumed that a standard connection is desired. The name-

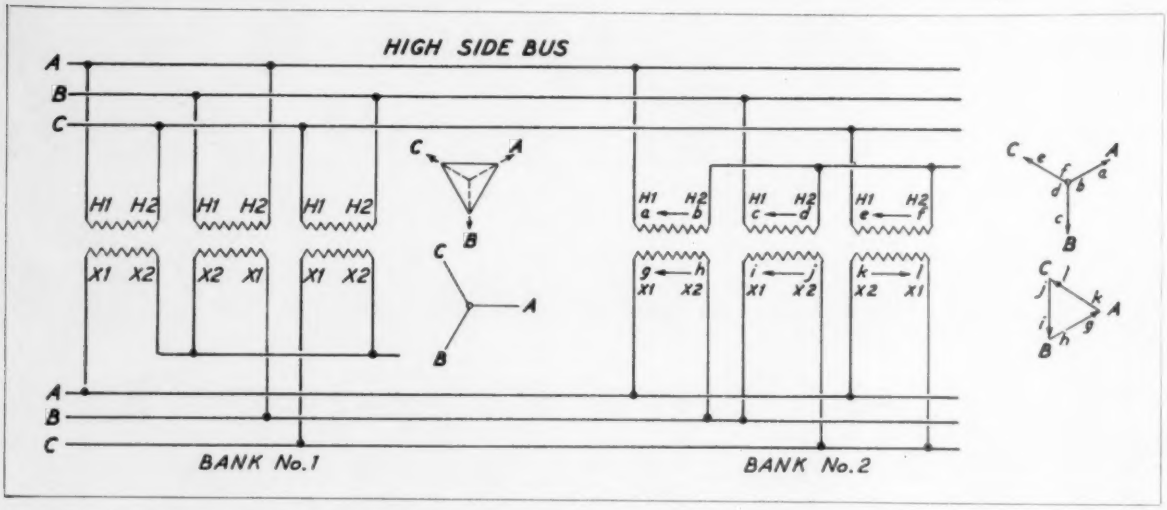
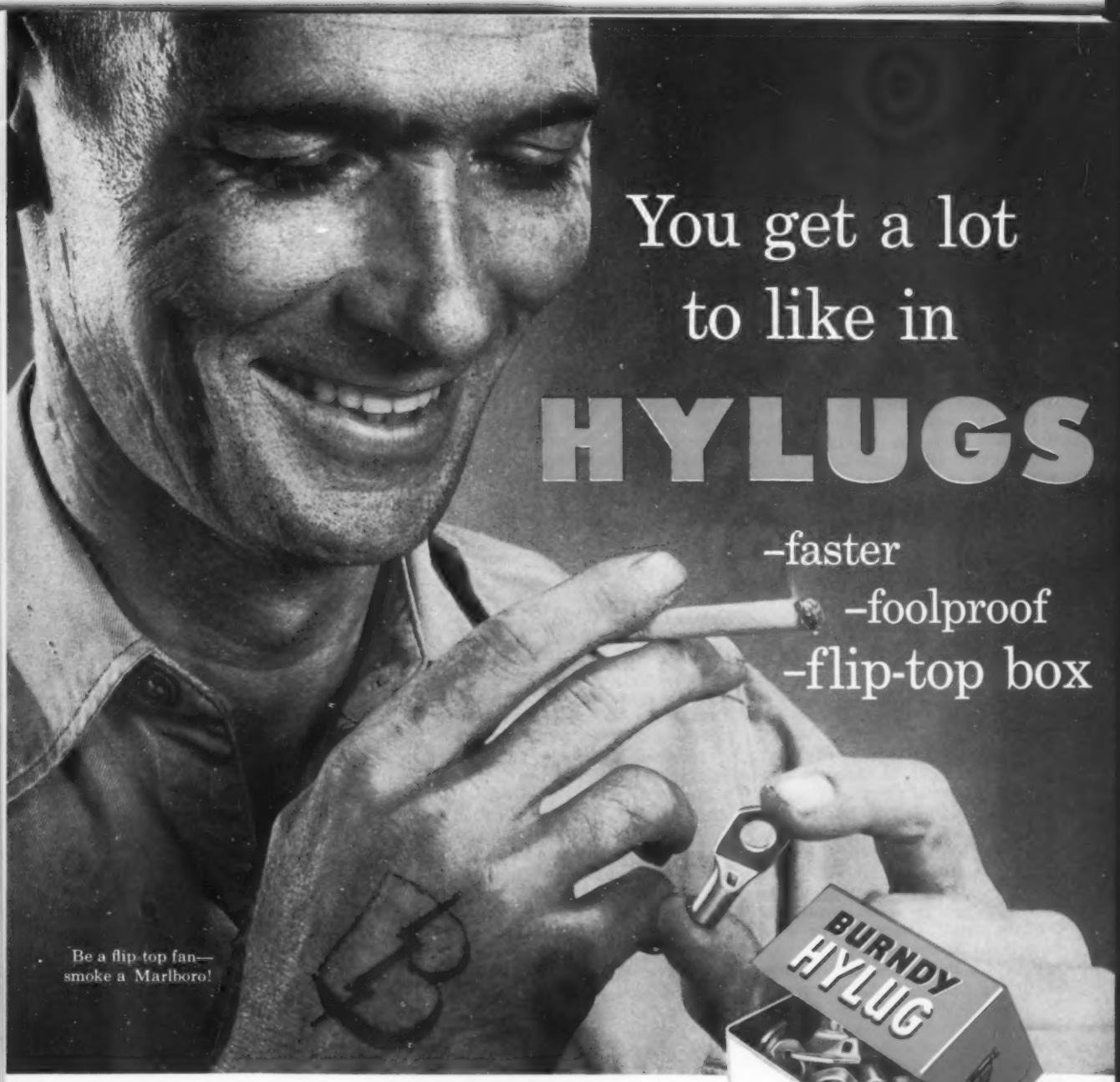


Fig. 2—Delta-wye (left) and wye-delta transformer connections for 30 degree high side lead.



Yes, there's lots to like in Burndy Hylugs — now packed in the new foolproof, faster, flip-top box! Wire, Hylug and stud sizes clearly marked on every box. Separate color-coded boxes for Hylugs and Hylinks. No more fussing, fumbling in your kit! Flick out the Hylug flip-top box, flip open the cover — make fast, dependable Burndy Hydent connections — indent on any side of barrel — controlled by the easy-to-use Burndy Hytool. Available in the flip-top box thru No. 8. In sturdy corrugated boxes up to 2000 MCM. Buy them today!

BURNDY

67-16

NORWALK, CONNECT. • SCARBORO, CANADA

plate markings are shown by the large letters with numerals; the small letters belong to the sketch only. The following procedure will illustrate the relation between vector and connection diagrams by developing them together:

First, draw a 120 degree wye with arrowheads and letter each A, B, C in such a way that if the whole figure is revolved counter clockwise the letters will assume the vertical position in the order A first, then B, then C. Now superimpose on each transformer the mentally conceived third winding of Sec. I to serve as the input winding. Then an input voltage to each transformer results in an output voltage in the high and low windings.

In each transformer, the high and low voltages are related to each other in direction as shown by the arrows placed near each winding. At the positive peak each is in a direction tending to force a current out at the H1 and X1 terminals. Tie the X2 terminals together to form the neutral and connect each X1 terminal to a separate bus conductor in any desired order. The three wye vectors represent the line currents and phase to neutral voltages in the low side external circuit.

In constructing a delta to lead this wye by 30 degrees one does not need to be concerned as to which side of the transformer bank is the source side, as the arrows indicate output for both windings. Put the small letters on the wye vectors to correspond to their locations on the windings. A little reasoning will suggest that since a 30 degree displacement is the smallest obtainable, one of the leads to be connected to the A phase of the high side bus must be the lead of the same polarity as the A phase on the low side. Applying the same reasoning to phases B and C, connect the corresponding H1 leads to the bus.

The connection diagram is now three fourths completed and it has not yet been necessary to draw the delta vectors. However, something is needed to show how to connect the remaining three leads in such a way as to obtain a delta lead instead of a delta lag.

Begin constructing a delta by first drawing a line parallel to a line of the wye, as A; a glance at the arrows tells us that each side of the delta must be parallel to the corresponding line of the wye since the parallel relation and the same direction is the vector representation for quantities in phase with each other.

Considering this line the base of the equilateral triangle, the position of the vertex will indicate whether the delta leads or lags the wye. Lines, bisecting the vertices and leaving the triangle at these points represent line to neutral voltages of the delta as applied to a wye connected load.

The stipulation of a delta lead, for this example, places one vertex below the horizontal. So mark the single horizontal vector a and b to correspond to the a, b, arrow of the winding. Beginning at the a end draw a line parallel to the B vector and in the same direction; mark this line c and d; close the delta with a line parallel to the vector C and denote the same direction; mark this line e and f.

Analyzing the completed delta note that a and d are together at one vertex; therefore, tie the transformer lead marked d to the same high side phase wire as the one to which a is tied. Continuing in this manner complete the delta connections as shown and add phase marking on the vector diagram.

Someone may note a difference in the middle transformer. This difference is more apparent than real. Attention has been called to the fact that it makes no difference how the transformer designer chose to arrange leads for external connection. Transformer terminal polarity is not dependent on physical location.

By way of further illustration, let us connect a wye-delta transformer bank, between the high side and low side busses of Fig. 1, for parallel operation with the bank just completed. First we note that one transformer of this group also has its leads of the same polarity arranged diagonally to each other instead of on one side of the rectangle as we might prefer. Then, realizing, that these physical arrangements make no difference electrically, we caution ourselves to be governed by terminal markings only and make a sketch, according to the same principles followed for Fig. 1. (See Fig. 2).

It is quite likely that some may point out that the method outlined is more laborious than necessary. However, a working knowledge of this, or a similar procedure, should be acquired before using shorter methods.

7200 volt lines

(Continued from page 61)

haven't lost any switch insulators in eight years but have lost several sets of arresters; however, the arresters can be replaced hot, whereas an interruption to both circuits is necessary to change switch insulators. The success of arrester installations of this type depends wholly on a good low resistance ground.

Branch lines are fused

The pole-type oil recloser has been the answer to the operating man's prayer. It would certainly be difficult to have to operate without them. The location and rating of pole type reclosers must be carefully selected to insure proper operation.

We do not use fuses in series with oil switches on our 12 kv lines, but we do fuse most branch lines extending from main lines. We never use fuses over one half of the rating of the breaker. Example: 50 amp breaker, 25 amp fuse on branch line.

Pole-type reclosers are not maintained in the field but are removed from the line and brought into the shop every two years, or forty operations, for complete examination, oil change and for both electrical and mechanical test.

Pole-type reclosers are protected by lightning arresters, connected to deep grounds, the resistance of which is 15 ohms or less.

"A well built system can be operated by most anyone; no one can properly operate a poorly built system."

Silicon sheet material

(Continued from page 69)

laboratory, which was completed just two years ago, has a variety of large furnaces, rolling mills, extrusion presses, forging hammers and other fabricating equipment, all of it without any "production responsibility" and thus available full-time for experimental work.

Processing steps for "four-square" iron follow the same general pattern as used in making singly-oriented materials. At the metals and ceramics building these steps begin by melting the raw material in a standard furnace. Subsequent rolling and heat-treating of the cast ingots produces long sheets of material approximately twelve inches wide.

SCENE: THE COUNTRY OVER

"Tough-Nut" Illumination Problems Solved by Sunbeam Lighting!

with Sunbeam Lighting s DV3600-M7 2' x 4' Visionaires, recessed in suspended ceiling. For high level, comfortable illumination.

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multi-level commercial garage with Sunbeam Lighting's 1901 Series open-type "antenna guard" Visionaires. Staggered-pattern installed for optimum general illumination.

with Sunbeam Lighting's HL3800 Series, large area, louvered, recessed Visionaires. High intensity, low brightness illumination. Balanced—for merchandise sales appeal.

with Sunbeam Lighting's 1100 Series, all-metal, luminous indirect, minimum-maintenance Visionaire. For demanding visual tasks.

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BETTER LIGHTING FOR BETTER VISION WITH VISIONAIRE LIGHTING FIXTURES

Notes on new utility equipment

Secondary connectors make neat service taps

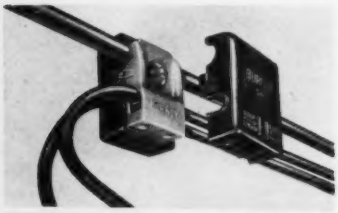
CABLED SECONDARY, a type of distribution line construction becoming increasingly popular, can now be tapped with connectors especially engineered for this purpose by Burndy Corp., Norwalk, Conn.

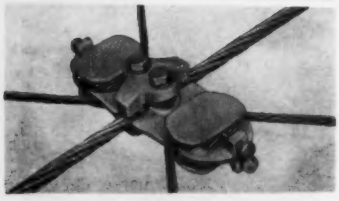
With these connectors, called "Spantaps," cabled secondary can be tapped from midspan or near the pole dependably, neatly and with great speed.

One phase unit and one neutral unit connect as many as four triplex services to a cabled secondary. One man can install the neutral, deadening and connecting it electrically in one operation. Services can be added to or removed from the phase connector without disassembling its insulating cover.

During prolonged heat-cycle tests of the phase unit, its relative conductivity remained stable above 100% and its temperature averaged 19.5°C below conductor temperature. After 300 hours exposure to concentrated salt spray, conductivity remained unaffected.

Tension tests of the neutral unit show that its electrical performance is independent of sag, span length,





and mechanical loading of the tap. Conductivity and holding strength remained high when the neutral connector was subject to prolonged vibration under tension.

For additional data, ask for item U-1001, using the coupon on page 106.

Electrical contact aid speeds up application

THE A. B. CHANCE Company of Centralia, Mo., is now offering "z.l.n. 100" Electrical Contact Aid in a plastic eight-ounce "squeeze" bottle.

The squeeze-type bottle is designed to permit a controlled flow of z.l.n. 100 . . . to speed application and to eliminate waste. Tough and resilient, the plastic will take rough treatment.

z.l.n. 100 is highly conductive, nontoxic, noninflammable, water-resistant, adhesive—and will not melt or become stiff through a temperature range of —25° to 340°.

For additional data, ask for item U-1002, using the coupon on page 106.

Single core and coil in potential transformer

TYPE APT high-voltage potential transformers that feature reduced cost, size, and weight are available from Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

The new transformer is a single core and coil unit with a single bushing and is available in voltage classes

from 92 to 161 kv. Although smaller and lighter than previous designs, it meets all ASA standards for high-voltage metering and relaying.

The new units are designed for line-to-neutral operation, but the Hipersil® cores are fluxed for line-to-line voltage during emergency. The Hipersil core provides maximum electrical performance with minimum size and weight.

Size and weight reductions are illustrated by the 115-kv transformer which is 100 inches high to bushing tip, has about 30 x 31-inch dimensions at base, and weighs only 1950 pounds.

The primary coils are of circular pancake construction, and are shielded to avoid localized concentration of dielectric stresses. The high-voltage lead is an integral part of the coil construction.

The secondary coils, of cylindrical form, are wound on a pressboard tube and assembled inside the high-voltage coils. The secondary leads are brought into the junction box through small bulk-type porcelain bushings.

The high-voltage bushing consists of a porcelain weather casing over a large, heavily-taped high-voltage lead. The lead is enclosed in a heavily insulated tube, forming a completely coordinated high-voltage outlet. The casing is mechanically supported by a metallic flange cushioned with a synthetic rubber gasket. The bushing flange is bolted to the case and sealed by a cork neoprene gasket.

A weatherproof secondary junction box bolted to the front of the case permits removal of the transformer proper without disturbing the secondary conduit connections. The junction box is arranged to accommodate 1½-inch conduit at both ends and bottom. It can be rotated 180 degrees on the case.

For additional data, ask for item U-1003, using the coupon on page 106.

Underground feeder cable available through 4/0 size

UNDERGROUND feeder cable of the UF type is now available for immediate delivery in all sizes up to and including 4/0 from the Columbia Cable and Electric Corp., of Brooklyn, N. Y.

The new sizes #2 to 4/0 are in single conductors only. This cable is listed by Underwriters Laboratories, and the 1956 National Electric Code now permits use of this cable on 600 volt lines for current values up to 195 amperes for direct burial in earth when provided with suitable overcurrent protection.

Considerable economies in material, accessories and labor can be effected by using Columbia UF to replace other types of more expensive cable or combinations of wire and conduit for direct burial applications such as: shopping centers, drive-in theatres, farms, multiple building factories, and many outdoor lighting applications. Samples are available on request.

For additional data, ask for item U-1004, using the coupon on page 106.

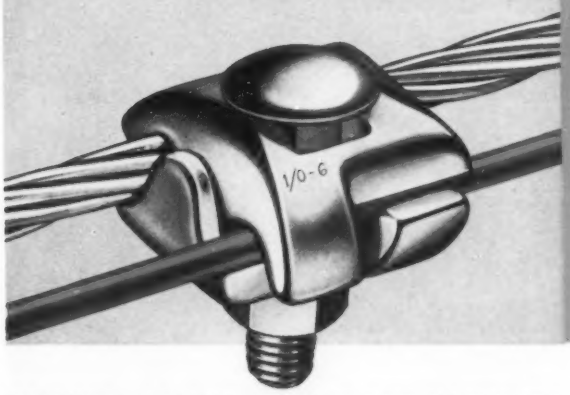
Compression connectors offer extra resistance

FOR LOOP-SPLICED joints of aluminum to copper conductors, or aluminum to aluminum, the new Penn-Sleeves, being manufactured by the Penn-Union Electric Corp., 315 State St., Erie, Penn., provide an extra margin of resistance to thermal and galvanic action.

To assure highest conductivity and strength these sleeves are forged from pure aluminum. Large smooth

You can standardize on one

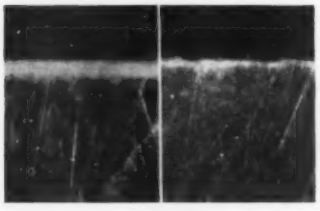
CHANCE AGP*
Parallel Groove Clamp
for all connections...



FORTIFIED CADMIUM... PROVED BEST BY TEST FOR JOINING ALUMINUM AND COPPER CONDUCTORS

"Your AGP connector, cadmium clad as you do it, is going to solve one of our greatest problems of making lasting A and C connections."—Power Company

"Your AGP clamps were subjected to approximately 500 hours in a humid sulphide atmosphere and after cleaning to remove the sulphide coating which had formed on the exterior, they showed no evidence of a breakdown of the fortified cadmium plating."—Eastern Utility



Micro-photograph shows how high-density FORTIFIED cadmium, applied to a thickness of .001" on Chance AGP Clamps, compares with commercial plating at right.

Aluminum to copper, copper to copper, copper to aluminum, or aluminum to aluminum

Connecting copper and aluminum conductor requires a general purpose connector as good as the conductor itself in conductivity, mechanical stability and corrosion resistance, if future trouble on the line is to be avoided.

The best conductor for this purpose is an aluminum bodied clamp with a properly applied coating of high density, fortified cadmium, proved best by every test for long-lasting, trouble-free, general purpose connections.

That's what you get in the Chance AGP Parallel Groove Clamp, companion to the widely tested and accepted Chance AGP Tap Clamp. You can standardize on one AGP clamp for any combination of aluminum or copper in a wide size range. Simplify stocking and eliminate the chance for error in installation.

*Aluminum General Purpose... the All-Purpose Clamp That Needs NO COPPER INSERT

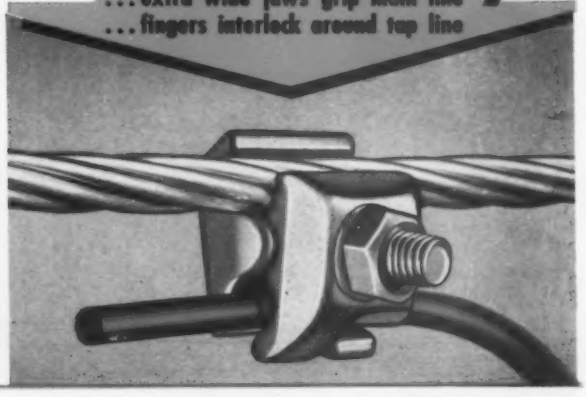
A. B. CHANCE COMPANY, Centralia, Missouri

Your choice of two designs

CC56-15

NEW PG 200 SERIES
...fingers interlock around main line and tap line

PG 100 SERIES
...extra wide jaws grip main line
...fingers interlock around tap line



In Aluminum General Purpose or Uncoated Aluminum

a new, crystal bright star

on the lighting horizon with
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THE PRISMATIC LOUVER-LENS

. . . employs thousands of plastic prisms to create functional, beautiful lighting patterns. Up to an amazing 86% efficiency with low brightness control comparable to accepted standards. Plus, *BREATHING ACTION*—for better maintenance and cooler operation.

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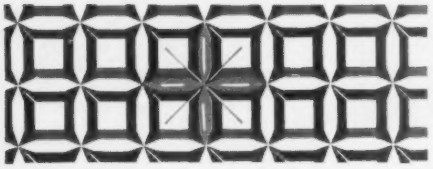
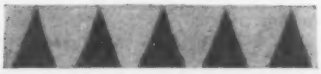


HERE'S A CROSS-SECTION:



Add this new touch of charm plus Guth's traditional lighting efficiency to your installations.

WRITE FOR ALL THE DETAILS OF THE EXCITING PRISMOID GRATELITE STORY

THE EDWIN F. Guth COMPANY

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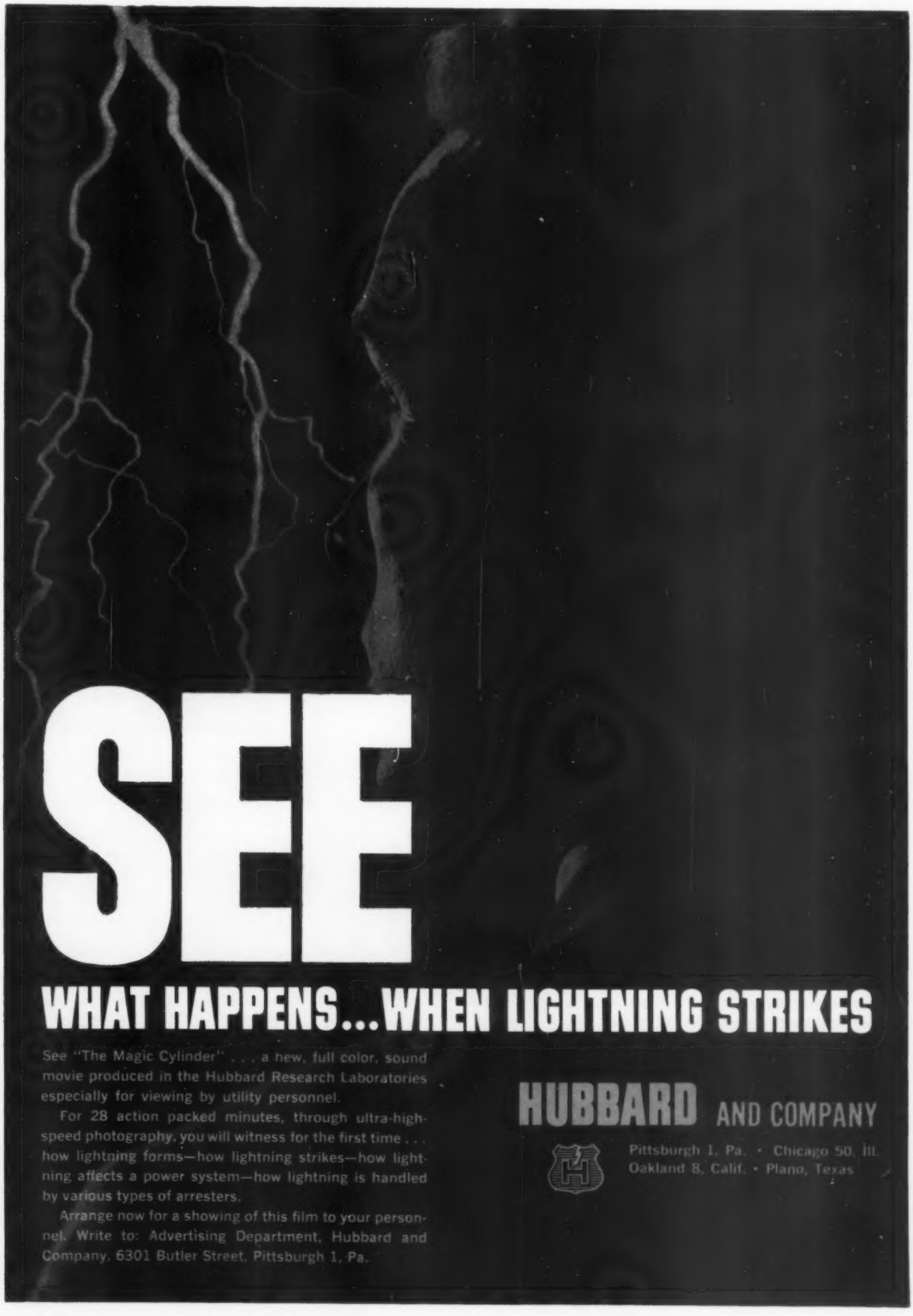
TRUSTED NAME IN LIGHTING SINCE 1902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entering radii give easy entrance for conductors, and minimize stress concentration and chafing from vibration. A solid integral barrier isolates the conductors, and prevents electrolytic corrosion. Penn-Sleeves are installed by standard grooves in hand or hydraulic tools.

The quality and performance of Penn-Sleeves are backed by test laboratory data and quality control. Contact surfaces are chemically cleaned and immediately protected with "Cual-Aid," an oxide inhibitor and contact aid.

Transparent brightly colored end-caps, conforming to industry color-code standards, need not be removed —the wires push right through. Complete cable accommodations are marked simply and very legibly near the center of each sleeve, well clear of the plastic end-caps, giving the markings full visibility. This lettering is not disturbed by the crimping, so the sleeve can be inspected at any time for proper installation.

Penn-Sleeves are packaged in special metal-edged one-piece cartons, for easiest storage and handling. To provide instant identification in the stock room, the carton labels show the end-cap code colors.

For additional data, ask for item U-1005, using the coupon on page 106.

Bituminized fiber conduit produced in ten-foot lengths

A COMPLETE LINE of bituminized fiber conduit produced in ten-foot lengths is now being offered by Kyova Fiber Pipe Co., of Ironton, Ohio.

Sizes are produced in 2, 3, 3½, 4, 4½, 5 and 6 inch diameters. All sizes are also available in 5' lengths on special order. The new company points out that the longer 10' lengths provide a 20 per cent reduction in cost of each handling operation, beginning with initial unloading from transportation carrier through all warehousing phases and including final installation.

For additional data, ask for item U-1006, using the coupon on page 106.

Versatile residential secondary capacitor

A NEW residential secondary capacitor design, available in 3, 5, and 7½ kvar, 240-volt ratings, is now going into production at the General Electric Company's Capacitor Department, Schenectady 5, N. Y.

Featuring an exclusive rectangular design, the new capacitors are designed for maximum, trouble-free service life. The rectangular design permits complete impregnation of each unit, thereby avoiding the possibility of internal failures caused by voids in the liquid dielectric. At the same time, the flat sides allow the unit to expand to safely and effectively contain any internal pressure caused by normal temperature rise during operation. Because they are completely impregnated, the new units can be mounted in any position —up, down or sideways.

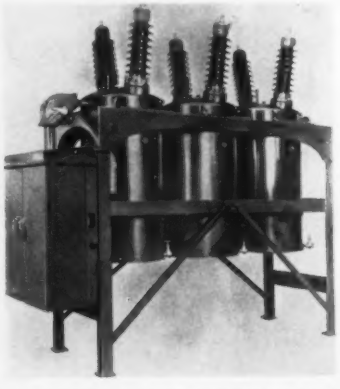
Heat generation is held at minimum by superior Kraft papers used in the manufacturing of the capacitor rolls. Owing to General Electric's multi-roll assembly, any heat which is generated is quickly and efficiently dissipated.

The new residential secondary design also features corrosion-resistant case material which can withstand the most severe atmospheric conditions, including rain, salt fog, high humidity, and chemically polluted air. The case will never require protective repainting.

For additional data, ask for item U-1007, using the coupon on page 106.

Frame mounted breakers with standard bushings

A NEW LINE of frame-mounted oil circuit breakers for 23, 34.5, 46 and 69 kv services utilizing drop-bar contact structure, hydraulic operating mechanisms, simplified mechanical linkage and new ASA standard bushings has been announced by the Pacific Switchgear Division, Federal Pacific Electric Co., 5815 Third St., San Francisco 24, Calif.



Rugged drop-bar design of the new type AF contact mechanism provides efficient application of a minimum number of parts for simplified adjustment and maintenance. Round contact blades of hard-drawn copper are tipped with silver-tungsten. Six-leaf-type contact shoes provide uniform contact pressure and liberal range of adjustment for non-galling, self-cleaning current-carrying surfaces which are unaffected by arcs.

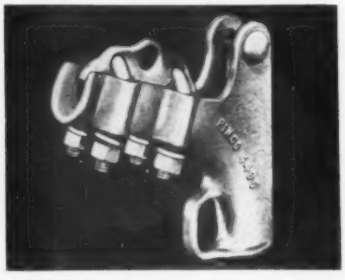
The breakers are equipped with standard type O interrupters based on the oil condensation principle. Oil is injected into the hot gas bubble to accelerate condensation and cooling and to provide a high dielectric recovery rate. Arc reignition is prevented and pressure build-up and oil deterioration are minimized.

For additional data, ask for item U-1008, using the coupon on page 106.

Distribution strain clamp redesigned for hot line work

A NEW FEATURE added to the keeper on the Pinco L4485 distribution strain clamp, manufactured by the Porcelain Insulator Corp., of Lima, N. Y., makes it easier than ever to work the line "hot."

Engineers have redesigned the keeper so it now has a built-in lift-off eye. To remove the keeper, linemen simply loosen the nuts from the U bolts, insert a hot stick into the built-in eye, and lift the keeper off the clamp.



Reassembly is just as fast, because the same eye is used to raise the keeper back into position on the clamp, and the free-swinging U bolts can be easily settled back into place, with a minimum amount of time being taken for both operations.

The Pinco L4485 clamp is made of hot dip galvanized malleable iron and is available with or without aluminum or copper liners. This clamp, along with three other similar Pinco clamps, are the only two-bolt, envelope quadrant types on the market that will accommodate up to .85" maximum cable seat diameter. They are distributed for Pinco by Joslyn Manufacturing and Supply Co.

For additional data, ask for item U-1009, using the coupon on page 106.

Universal strain clamp for distribution deadends

A UNIVERSAL strain clamp, designed for faster, more efficient installation, is now available for distribution deadend use, and is being manufactured by the Ohio Brass Co., 380 North Main St., Mansfield, Ohio.

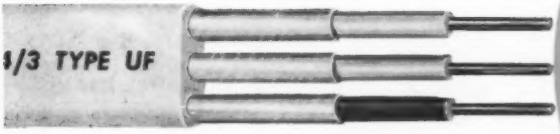
Spring clipping the keeper piece

NEW!

savings on direct burial feeders

NEW!

COLUMBIA UF now in sizes thru 4/0



NEW!

lower material costs lower labor costs

1956 NEC regulations now permit the use of UF in single conductor sizes through 4/0 for direct earth burial (when provided with overcurrent protection) on 600 volt lines. Now you can save both on materials and labor by using Columbia UF in place of other types of more expensive cable or in place of wire and conduit combinations for direct burial applications.

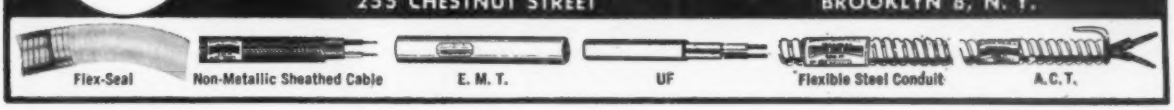
Columbia UF is available in two and three-conductor assemblies, with and without ground wire, and in single-conductor sizes through 4/0.

Approved by Underwriters' Laboratories

COLUMBIA CABLE & ELECTRIC CORP.

Serving the Electrical Wholesaler Since 1912

255 CHESTNUT STREET BROOKLYN 8, N. Y.



permanently to the clamp body completely eliminates the need for holding and aligning the keeper, threading nuts on bolts or fumbling with loose parts.

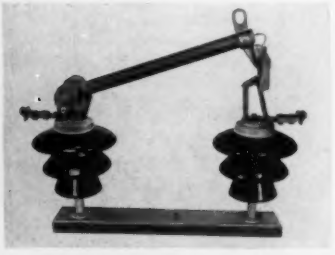
The new universal clamp (No. 88500) takes the full range of conductor from .02 to .50 inches diameter. Spring tension holds the keeper piece in an open position during installation and maintenance. All work can be done from one side of the clamp.

Excellent corrosion resistance is provided by the clamp's galvanized malleable iron construction. The new clamp possesses excellent holding strength.

For additional data, ask for item U-1010, using the coupon on page 106.

Fiberglass tubes increase interrupting capacities

FUSE TYPES FHB-1, FHM-1 and FHMH-1, manufactured by the Southern States Equipment Corp., of Hampton, Ga., are equipped with



fiberglass tubes. Interrupting capacities have been substantially increased over fuses with conventional fuse tubes.

Another feature of these new fuses is the shielding provided in fuse tubes, 46 kv and above, as a measure to prevent fuse link damage from corona.

The FHB-1 is available in voltage ratings of 7.5-69 kv; the FMH-1 is available in voltage ratings of 69-115 kv, the FHMH-1 is available in voltage ratings of 60-161 kv.

For additional data, ask for item U-1011, using the coupon on page 106.

Fish tape for standard and heavy duty conduit

FISH TAPE in a range of sizes and weights for light, standard, and heavy duty conduit work is now being manufactured by T. J. Cope Division of Rome Cable Corp., Collegeville, Pa., makers of underground installation equipment.

Made of spring steel, the fish tapes come fitted with a ball roller end, plus a hand grip for both pushing and pulling. Tapes are mounted in a steel frame.

Seven sizes of fish tape are available, the smallest for light duty measures ¼" x 1/16" and weighs but 11 lbs. per 100 ft. Largest tape is 1" x ⅛" at 49 lbs. per 100 ft. All sizes may be had in lengths of 100 to 500 ft.

The use of fish tape is a commonly accepted method for getting the first line through a conduit—particularly short runs and small ducts. For larger conduit and longer lengths, the company recommends the powerful Cope Pneumatic Fishline, an air-operated device which makes it possible to fish conduits—regardless of length and diameter—in a matter of minutes.

For additional data, ask for item U-1012, using the coupon on page 106.

Cradleclip wiring system suitable for all climates

AVAILABILITY of the new Insuloid "Cradleclip" wiring system has been announced by Electrovert Inc., 489 Fifth Ave., New York 17, N. Y.

The "Cradleclip" wiring system consists of the following: binders and extensible clips for unsupported wiring and cradles with extensible clips for anchored wiring.

The binders and cradles are moulded from tough nylon and are virtually unbreakable . . . the extensible clips are moulded Neoprene which combines the right degree of toughness and flexibility to hold any type of cables securely and without damage. Ideal for service in all climatic conditions with a temperature range of —60°C to +100°C.

The "Cradleclip" wiring system is reported to take only 5 seconds for each fixing point. The cradles, used for anchored wiring, are screwed in place, the cables are laid in position and a clip is hooked to the cradle.

For unsupported fixing, a binder is held in place on one side of the cable and then secured in position with a clip . . . quickly, easily and efficiently.

The "Cradleclip" binders, clips and cradles are available in a wide assortment of sizes to meet the requirements of cable groupings having a diameter of ¼ inch to 2¼ inch.

For additional data, ask for item U-1013, using the coupon on page 106.

Reverse action pipe-pusher attachment for trencher

A NEW ATTACHMENT for their hydraulic backhoe which accurately drives pipe or service lines under roads, sidewalks or lawns is now being offered by Henry Manufacturing

Co., Inc., 1700 N. Clay St., Topeka, Kan. Called the Ram-A-Rod, this pipe pusher will push or pull ¾ inch to three inch pipe or tubing.

Because of its ability to pull pipe out quickly if a major obstruction is encountered, it is never necessary to cut pipe off and leave it in the hole. The Ram-A-Rod will push through sand, clay or rocky soil, and it has pushed over 100' of ¾" pipe with no strain at all.

The Henry pipe pusher has a 6" driving stroke and will deliver approximately 30 tons of pressure on the push pipe. The backhoe's stability gives the Ram-A-Rod unusual accuracy.

For additional data, ask for item U-1014, using the coupon on page 106.

Ditch-Witch trencher for service lines and footings

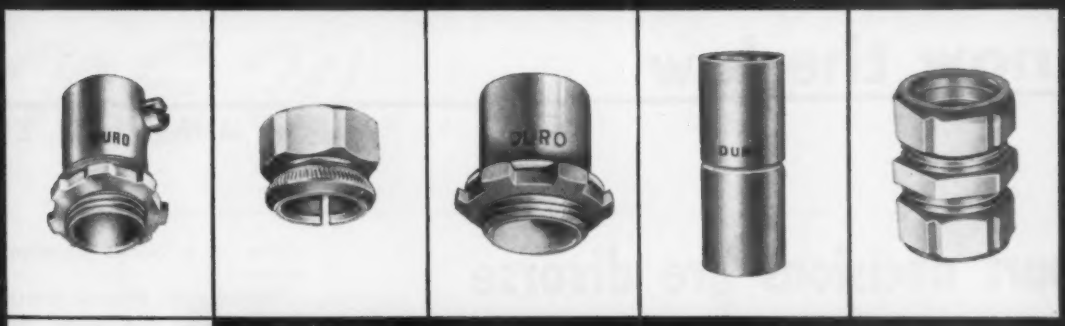
DESIGNED to provide the contractor and utility company with a high performance trencher for service lines and footings, the model LD, Ditch-Witch trencher is being offered by the Charles Machine Works Inc., of Perry, Okla.

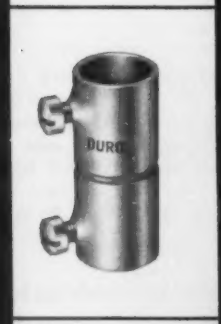
The Model LD is completely mobile with trenching speeds up to 8 fpm

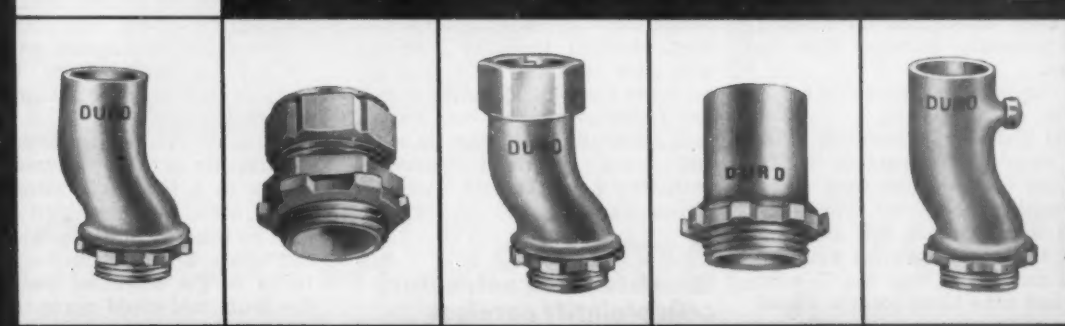
and road speed up to 5 mph. Standard trench widths are available from 4" to 16" at 2" intervals. The machine will dig a 4" or 6" trench to a depth of 42". Approximately 6" less depth is obtainable for each additional 2" width of trench.

The model LD Ditch-Witch features an 18 hp air-cooled engine, automotive type steering.

For additional data, ask for item U-1015, using the coupon on page 106.







DURO

The ONLY COMPLETE LINE OF EMT CONDUIT FITTINGS

- ★ Every size fitting through 2"
- ★ Each fitting fully threaded
- ★ All fittings sized
- ★ Full range of offset fittings
- ★ Lock nuts of heavy gauge steel
- ★ UL Approved

Write for Catalog

DURO FITTINGS COMPANY

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Know the law

by Arthur L. H. Street

Court decisions are diverse on job accident liability

Subcontractor is liable for negligent action

THE PROBLEM: Among subcontractors on a skyscraper building job was an electrical contracting company that undertook to keep floors properly lighted for carpenter subcontractors. The electrical subcontractor failed to properly light a floor, only one of several sockets having bulbs therein. An employee of the carpentry subcontractors strung an electric cord across the floor to connect with a power-saw table. Not seeing the cord, plaintiff, an employee of a company engaged in installing telephones, stumbled over the cord and was injured. Were the electrical subcontractor and the carpentry subcontractors liable?

COURT'S ANSWER: Yes. The Pennsylvania Supreme Court decided that the injured man was excusable in not seeing the cord on the floor.

As to the liability of both subcontractors sued, the court said that the plaintiff must be regarded as having been a "business visitor" in the building, whose presence they were bound to foresee. They must also do nothing that naturally exposed him to danger.

As to the electrical subcontractor, the court said:

"Did Fishback & Moore use the care required to protect Duffy from the harm which they could reasonably anticipate? The jury found that they did not; and certainly one cannot quarrel with the jury's conclusion that one 75-watt bulb and nine blind sockets would not provide anyone with sufficient illumination (under the circumstances of this case) to see with precision the ground ahead unless he got down on his hands and knees and crawled forward with the concentration of a detective seeking footprints.

Nor is there any doubt that Fishback & Moore had notice of the dim lighting which concealed the aggresive extension cord in ambush." (Duffy v. Fishback & Moore, Inc., 126 Atl. 2d 413.)

Overlooked safety order makes contractor liable

THE PROBLEM: State building construction regulations often govern the liability of property owners and general contractors for injuries to an electrical contractor's employees. For example, a California safety order required that temporary wooden treads be placed on uncompleted stairways, by filling the treads with cement or other material. The order was not complied with and an employee of an electrical subcontractor installing a fire alarm system tripped and fell down the stairway. Was the prime contractor liable?

COURT'S ANSWER: Yes. The California Court of Appeals, First District, decided that the evidence was such that the jury was not bound to find that the injured man had failed to use due care for his own safety, in which case he could not have collected damages. (Atherley v. MacDonald, Young & Nelson, Inc., 298 Pac. 2d 700.)

Court favors contractor, calls plaintiff careless

THE PROBLEM: The evidence in a suit for damages for personal injuries in a North Carolina case showed:

Defendants, general contractors for the repair of a burned building, employed plaintiff, who had been engaged in the electrical business 36 years, to do temporary electrical work in the burned building to supply light so the repair work could begin. Plaintiff, in doing his work, was walking a foot or so to the right of a ragged edged burned-out hole in the floor six or eight feet square, that he had seen and passed several times before, when a board broke under his left foot, and he fell into the basement, receiving injuries.

COURT'S ANSWER: The North Carolina Supreme Court decided that the suit was properly dismissed on the double ground that the general contractor was not at fault, and that plaintiff had not used due care for his own safety. (Swanger v. Rice, 96 S. E. 2d 836.)

Court warns contractor about accident hazard

THE PROBLEM: (Hypothetical case) Electrical work is being performed on business premises where persons are coming and going. An electrical cord is permitted to lie slack on the floor. A business visitor, using due care for his own safety, trips over the cord and is badly injured. Is the occupant of the premises or the electrical contractor or both liable for damages to the injured man.

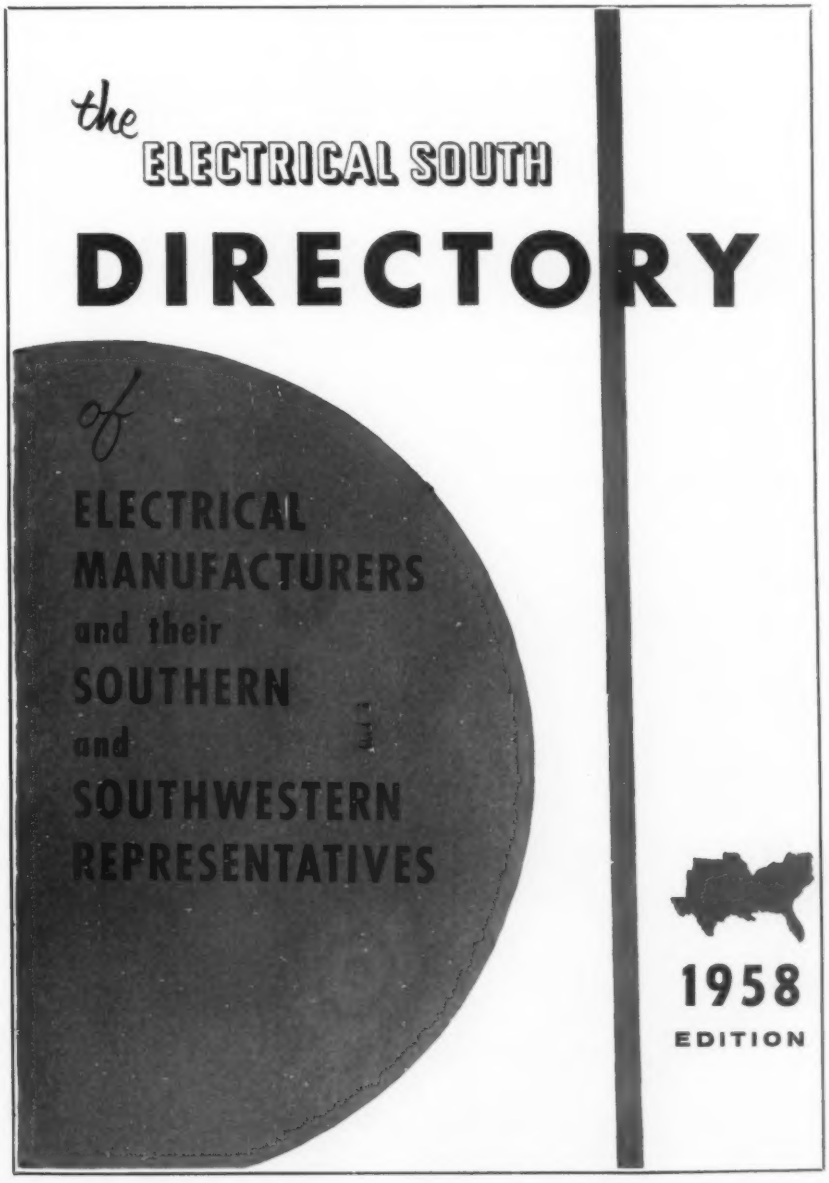
COURT'S ANSWER: Yes. (Deane v. United States of America, 244 Fed. 2d 776, decided by the United States Court of Appeals, District of Columbia.)

Actually, the case involved only the liability of the Government for injury to a business visitor to a public office, who stumbled over a cord on the floor at the entrance to the office. The cord was attached to an adding machine. But what the court said could cover the hypothetical case above mentioned:

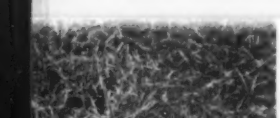
"We think it clearly negligent to

(Continued on page 126)

NEW...



Coming in December, 1957



L-M's Obround Design Provides

L-M's obround transformer is small, light, and has short moment arm distance from the pole. Total bending moment is greatly decreased and potential capacity of all your transformer structures is increased. Good regulation, high overload capacity and other Round-Wound characteristics have been fully maintained in L-M's obround design.

L-M's Obround Design Provides Less Bending Moment On The Pole

By **D. A. MANNING**
Assistant Product Manager
Transformers
Line Material Industries

L-M's exclusive obround transformer provides a smaller tank with less transformer oil, resulting in a light, easy-to-handle transformer. The obround design also brings the center of gravity of the transformer closer to the pole. The combination of light weight and short moment arm substantially reduces the total bending moment on the pole, and thus greatly increases the potential capacity of all your transformer structures. This advantage was accomplished without changing the outstanding performance characteristics of the Round-Wound® design.

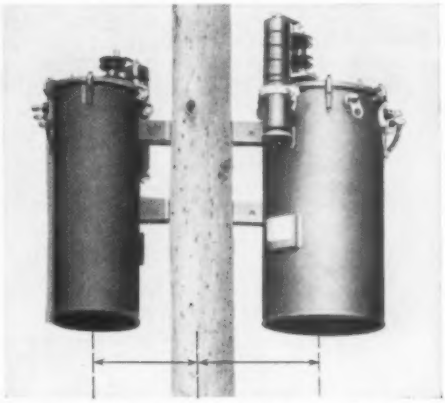
A comparison with four other major makes shows that the low bending moment of L-M's obround design is exceeded by as much as 50%. See the chart.

COMPARE Percent Bending Moment for All Five! See why more customers are selecting L-M obround transformers.

RATING	MANUFACTURER				
2400/4160 Y Voltage	Percent of L-M Bending Moment				
	LM	A	B	C	D
25 KVA	100%	110%	123%	133%	128%
50 KVA	100	123	113	142	120
100 KVA	100	123	115	137	132
167 KVA	100	105	093	115	091
7200/12470 Y Voltage	LM	A	B	C	D
25 KVA	100	131	124	149	126
50 KVA	100	123	110	150	119
100 KVA	100	119	122	149	125
167 KVA	100	107	087	112	089

In addition to reducing the bending moment for equivalent transformer ratings, you can now hang transformers of larger capacity on a pole structure and take advantage of savings such as these:

- Single-pole, three-phase transformer structures can now hold three 50 kva obround transformers instead of three 37½ kva round tank transformers. Thus you obtain 33⅓% more capacity and 15% less bending moment on the pole, and eliminate the need for a costly two-pole structure.
- Three 167 kva obround transformers can now be installed on a two-pole structure, obtaining 67% more capacity and less bending moment on the pole than with three 100 kva older-design transformers.



Comparison of these two 25 kva transformers shows how much closer the center of gravity of the obround design is to the pole than with the round design. The result is less bending moment on the pole.

Round-Wound Performance

An outstanding fact to consider on the L-M obround transformer is that, unlike the extremely light transformers of some manufacturers, there has been no sacrifice of performance characteristics. The obround retains all the outstanding performance characteristics of L-M's Round-Wound core-coil design. These characteristics include low exciting current, low noise level, high impulse strength, high short-circuit strength, high short-time overload capacity and many others.

Get Details on L-M's Obround Transformer

Ask the L-M Field Engineer for application information, weights and dimensions on obround transformers and L-M's exclusive Round-Wound design. Or write Line Material Industries, Transformer Division, Zanesville, Ohio.

LINE MATERIAL Industries
McGRAW-EDISON COMPANY
Transformers

McGRAW EDISON

New, revised estimating tables continued in this issue

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

CLAY CONDUIT - MULTIPLE DUCTS - STD. LENGTHS

SIZE & NO. DUCTS	HRS. PER FOOT	LABOR COST INSTALLED PER FT. @ FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
3 1/4" - 2	.1	.125	.15	.175	.20	.225	.25	.275	.30	.325	.35	.375
3 1/4" - 4	.15	.19	.225	.26	.30	.34	.375	.41	.45	.49	.525	.56
3 1/4" - 6	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
3 1/4" - 9	.3	.375	.450	.55	.60	.68	.75	.85	.90	.98	1.05	1.13
3 1/2" - 2	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
3 1/2" - 4	.25	.31	.38	.44	.50	.56	.63	.69	.75	.81	.88	.94
3 1/2" - 6	.3	.375	.45	.53	.60	.68	.75	.85	.90	.98	1.05	1.13
3 1/2" - 9	.35	.44	.53	.61	.70	.79	.88	.96	1.05	1.14	1.23	1.31
4 1/4" - 2	.25	.31	.38	.44	.50	.56	.63	.69	.75	.81	.88	.94
4 1/4" - 4	.3	.375	.45	.53	.60	.68	.75	.83	.90	.98	1.05	1.13
4 1/4" - 6	.35	.44	.53	.61	.70	.79	.88	.96	1.05	1.14	1.23	1.31
4 1/4" - 9	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50

E-101-B

LABOR: Includes preparation, laying, aligning & sealing joints.

10-57

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Electrical South Data Sheets — Series III — Electrical Estimating

Simplex Wire & Cable Company's new 1,400,000 volt impulse generator — the first of its kind to be installed in North America — represents just one aspect of research at Simplex. Simplex scientists and engineers originated the process of vulcanizing portable rubber cords and cables in a lead mold. Simplex developed the first heavy-duty portable electrical cable — Simplex TIREX. The first truly moisture-resistant rubber insulation was the outcome of a commercially acceptable method of deproteinization developed by Simplex. Simplex designed the first interlocked armored cable for underground service — Simplex CONDEX. And now — Simplex C-L-X — the portable, corrugated metallic duct WITH SEALED-IN CABLE. **SIMPLEX WIRE & CABLE CO.,** Cambridge, Massachusetts and Newington, New Hampshire.

LIVE BETTER ELECTRICALLY

Simplex

Highest quality cables for: Mining • Power & Lighting • Construction • Transportation • Communications • Signalling

FIBER CONDUIT IN TRENCHES - CONCRETE ENCASED

CONDUIT HOURS FOR STRAIGHT RUNS ONLY

CONDUIT SIZE	HRS. "C"	LABOR COST INSTALLED PER FT. OR EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
1"	4.1	.051	.062	.072	.082	.092	.103	.113	.123	.133	.143	.154
2"	4.7	.059	.071	.082	.094	.106	.118	.129	.141	.153	.165	.176
3"	5.5	.069	.083	.096	.11	.124	.138	.151	.165	.179	.193	.206
4"	6.3	.079	.095	.11	.126	.142	.158	.173	.189	.205	.221	.236
4 1/2"	7.2	.09	.108	.126	.144	.162	.18	.198	.216	.234	.252	.27
5"	8.4	.105	.126	.147	.168	.189	.21	.231	.252	.273	.294	.315
6"	9.7	.121	.146	.17	.194	.218	.243	.267	.291	.315	.34	.364
SIZE RADIUS	HRS. EA.	45 AND 90 DEGREE BENDS (ADD AS REQUIRED)										
1" - 18"	.32	.40	.48	.56	.64	.72	.80	.88	.96	1.04	1.12	1.20
2" - 18"	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
3" - 24"	.42	.53	.63	.74	.84	.95	1.05	1.16	1.26	1.37	1.47	1.58
4" - 36"	.53	.66	.80	.93	1.06	1.19	1.33	1.46	1.59	1.72	1.86	1.99
4 1/2" - 36"	.58	.73	.87	1.02	1.16	1.31	1.45	1.60	1.74	1.89	2.03	2.18
5" - 36"	.63	.79	.95	1.10	1.26	1.42	1.58	1.73	1.89	2.05	2.21	2.36
6" - 36"	.75	.94	1.13	1.31	1.50	1.69	1.88	2.06	2.25	2.44	2.63	2.81

E-102-B

LABOR: Includes cutting, tooling ends, installing straight runs and handling material at site.

10-57

FIBER CONDUIT FITTINGS

OFFSETS IN CONCRETE (ADD AS REQUIRED)

COND. SIZE	HOURS EACH	LABOR COST EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
1"	.48	.60	.72	.84	.96	1.08	1.20	1.32	1.44	1.56	1.68	1.80
2"	.53	.66	.80	.93	1.06	1.19	1.33	1.46	1.59	1.72	1.86	1.99
3"	.64	.80	.96	1.12	1.28	1.44	1.60	1.76	1.92	2.08	2.24	2.40
4"	.8	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00
4 1/2"	.85	1.06	1.28	1.49	1.70	1.91	2.13	2.34	2.55	2.76	2.98	3.19
5"	.95	1.19	1.43	1.66	1.90	2.14	2.38	2.61	2.85	3.09	3.33	3.56
6"	1.2	1.50	1.80	2.10	2.40	2.70	3.00	3.30	3.60	3.90	4.20	4.50
SR - F & R		ADAPTERS (TO STEEL) (ADD AS REQUIRED)										
1" to 2"	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
2" to 3"	.48	.60	.72	.84	.96	1.08	1.20	1.32	1.44	1.56	1.68	1.80
3" to 4"	.53	.66	.80	.93	1.06	1.19	1.33	1.46	1.59	1.72	1.86	1.99
4" to 4 1/2"	.58	.73	.87	1.02	1.16	1.31	1.45	1.60	1.74	1.89	2.03	2.18
4 1/2" to 5"	.64	.80	.96	1.12	1.28	1.44	1.60	1.76	1.92	2.08	2.24	2.40
5" to 6"	.8	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00
		REDUCERS (ADD AS REQUIRED)										
1" to 2"	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
2" to 3"	.48	.60	.72	.84	.96	1.08	1.20	1.32	1.44	1.56	1.68	1.80
3" to 4"	.53	.66	.80	.93	1.06	1.19	1.33	1.46	1.59	1.72	1.86	1.99
4" to 4 1/2"	.69	.86	1.04	1.21	1.38	1.55	1.73	1.90	2.07	2.24	2.42	2.59
4 1/2" to 5"	.8	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00
5" to 6"	.9	1.13	1.35	1.58	1.80	2.03	2.25	2.48	2.70	2.93	3.15	3.38

E-101-B

LABOR: INCLUDES HANDLING AT SITE, LAYOUT, TYING AND INSTALLATION, CUTTING AND TOOLING AS REQUIRED.

10-57

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MORE BUILDERS INSTALL STA-BRITE

here's why...

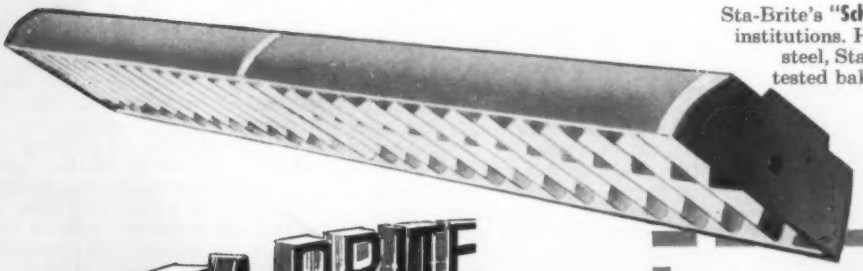
1 **Complete selection.** Sta-Brite offers a complete line of fluorescent fixtures, offers a model for every need, will design special models to meet unusual requirements.

2 **Highest quality.** Sta-Brite manufactures from heavy-gauge steel, bonderizes fixtures to withstand rigorous climate conditions. Sta-Brite guarantees fixtures for *two* years!

3 **Fast service.** Sta-Brite creates good will among builders by delivering on time as specified from Sta-Brite's strategically located Southern plant!

4 **Engineering service.** Sta-Brite has a complete engineering department with free consulting service to architects and your customers.

It will pay you to take a closer look at the Sta-Brite line to land more sales in all fields. Sta-Brite does not compete with distributors and dealers, does not sell direct, refers leads in your area to *you!*



Sta-Brite's **"Schoolite,"** designed for *all* institutions. Heavy-gauge die-formed steel, Sta-Brite chip-proof ETL-tested baked enamel. Completely wired with lead lag, parallel U.L. and ETL approved ballasts.

S-B-3

STA-BRITE Fluorescent Manufacturing Company

Sta-Brite Fluorescent Manufacturing Company
3550 N.W. 49th Street, Miami 42, Fla.

Please send me catalogue and complete information on Sta-Brite.

Name.....

Address.....

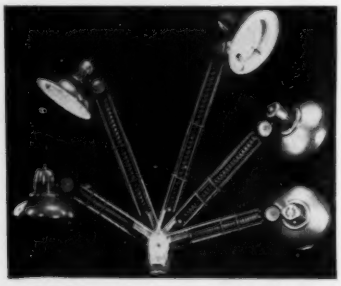
City & State.....

Lighting products parade

Incandescent and fluorescent lighting in gliding fixture

A LIGHTING UNIT that glides and rotates readily into many unique working positions is the recent development of the Amplex Corp., 111 Water St., Brooklyn 1, N. Y.

The "Trombolite" features a combination of incandescent-fluorescent lighting said to provide highly improved "vision-aid" illumination over



working areas. It's applications include lighting for scientific and professional use, draftsmen, engineers, architects, artists, jewelers, office desk lighting and as an examining light for physicians and dentists.

For additional data, ask for item L-1016, using the coupon on page 106.

Dry-type transformer features removable panel

DESIGNED for lighting applications in circuits of 600 volts and less, the new Class H series insulated, dry-type transformers have been introduced by R. E. Uptegraff Manufacturing Co., Scottdale, Pa. They are rated at 3, 5, 7½ and 10 kva.

Feature of these new Uptegraff Type H Transformers is the removable front panel which makes the clamp-type terminals easily accessible for neat and quick wiring. Using

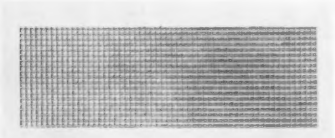
grain-oriented core steel, the core and coil are elastically suspended for quiet operation. The transformers have exceptionally low exciting current.

For additional data, ask for item L-1017, using the coupon on page 106.

Prismatic louvered lens give increased ventilation

CRYSTAL BEAUTY and prismatic light control features of Prismoid-Gratelite are now available on many of the luminaires offered by the Edwin F. Guth Co., 2615 Washington Blvd., St. Louis 3, Mo.

Prismoid-Gratelite's 86.1% efficiency is ideal for general illumination purposes. This new louver-lens provides a full 45° x 45° lamp shield-



ing for greater eye protection and optimum sight performance.

Because Prismoid is open like a louver, increased ventilation is possible to assure longer-lasting ballast and cleaner lamps. This "breathing action" permits free movement of air currents to help keep Prismoid panels cleaner.

For additional data, ask for item L-1018, using the coupon on page 106.

425 and 1000 watt lamps added to mercury vapor line

THE ADDITION of four new types to its mercury vapor lamp line has been announced by the Lighting Division, Sylvania Electric Products Inc., P. O. Box 831, Wheeling, West Virginia.

Two of the types are 1000-watt color-improved lamps, while two are in the 425-watt line.

The 1000-watt lamps are semi-reflector types, and with these lamps many existing installations using 1000 watt lamps may obtain more light by installing the Sylvania D-H15 or D-H12 in place of the existing lamp. New installations may use fewer fixtures.

The 425-watt A-H17 and A-H18 mercury vapor lamps are expressly designed for use in the popular 277/480 volt systems and thereby take advantage of the economies of this system.

For additional data, ask for item L-1019, using the coupon on page 106.

Three-phase lighting offers great savings

LARGE SAVINGS on installations utilizing standard lamps, standard sockets and standard fixtures is claimed by the new three-phase fluorescent lighting system manufactured by Strob-Lite, Inc., 733 Washington St., Lynn, Mass.

This type of fluorescent illumination uses three-phase current to receive maximum Stroboscopic correction of natural light and lessens eye fatigue.

The three-phase, three-wire ballast (208 to 277 volts) is used for all fixtures.

Listed by Underwriters Laboratories, this lighting system is said to be suitable for stores, factories, offices, buildings, manufacturing plants, gasoline stations, signs and street lighting.

For additional data, ask for item L-1020, using the coupon on page 106.

Adjustable attachment for lighting ducts

SWIVELIER Co., Inc., 43-34th Street, Brooklyn 32, N. Y., manufacturer of adjustable lighting units, announces the introduction of a new unit for

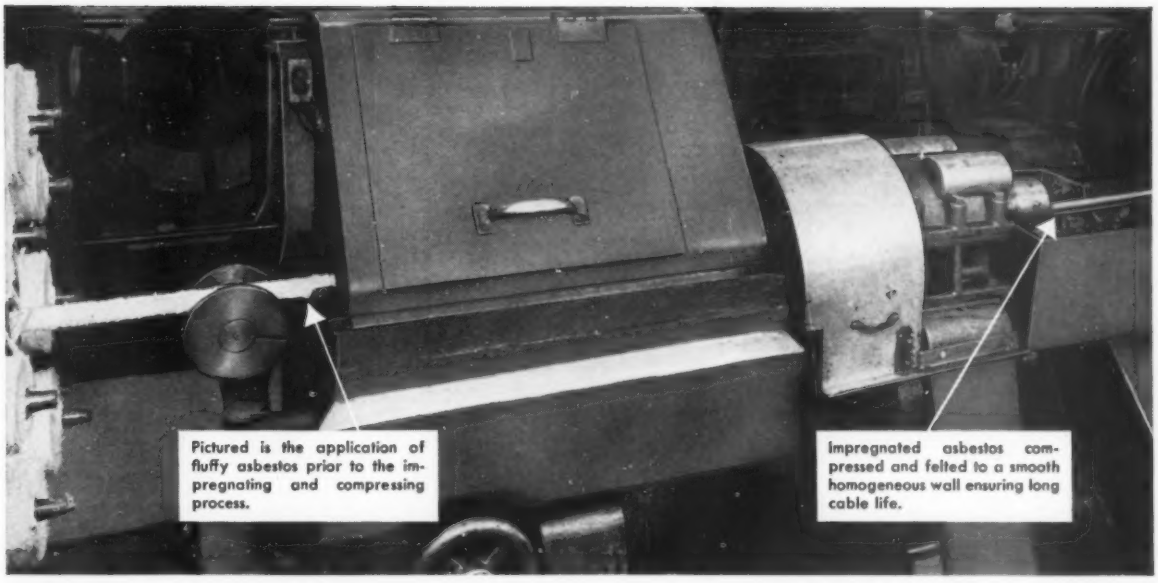
Trol-E-Duct attachment for use in lighting store windows, interiors, galleries, displays, exhibits, etc.

The combination of BullDog Trol-E-Duct, providing instant power along its entire length, and Swivelier spring-tension units, providing universal adjustability without wing nuts or set screws, has resulted in a most flexible lighting system.

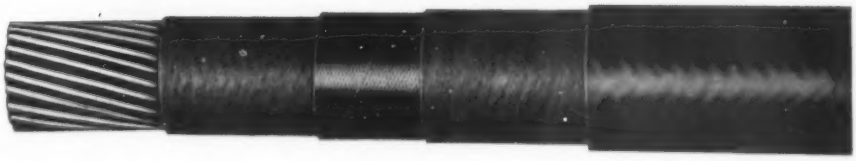
For additional data, ask for item L-1021, using the coupon on page 106.

Internally prewired recessed fixtures

INTERNALLY PREWIRED recessed fixtures that need no external outlet box have been introduced by The John C. Virden Co., 6103 Longfellow Ave.,


Pictured is the application of fluffy asbestos prior to the impregnating and compressing process.
Impregnated asbestos compressed and felted to a smooth homogeneous wall ensuring long cable life.

Felted Asbestos Walls + Impregnation with Selected Compounds + Quality Varnished Cambric Tapes . . .



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ROCKBESTOS A.V.C.® (N.E.C. TYPE AVA) QUALITY

Different brands of N.E.C. Type AVA wire and cable may look alike on the surface but the sure proof of quality that means dependable service is beneath the braid.

In the Rockbestos A.V.C. construction dense, felted, thoroughly impregnated asbestos walls seal the varnished cambric tapes away from air and moisture.

The varnished cambric tapes are made to Rockbestos exacting specifications and are applied under controlled methods assuring uniform dielectric strength.

The result . . . you get long life and dependable service under every type of operating conditions . . . in temperatures up to 230°F.

Complete construction and test specifications of Rockbestos A.V.C. are in the new booklet: "Specifications RSS-88". Write for your copy.

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Standard Rockbestos A.V.C. construction (N.E.C. types AVA, AVB, etc.) are available for immediate shipment. Call or write nearest branch office.

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Maximum Efficiency
Finest Automatic Control

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For complete home heating, individual rooms, additions. Ideal for families subject to transfer. Move as readily as furniture. Perfect for supplementary or early-season heat. Sensible plan for stores, beauty shops, offices. Available in 3 capacities: 2, 3 and 4 KW.

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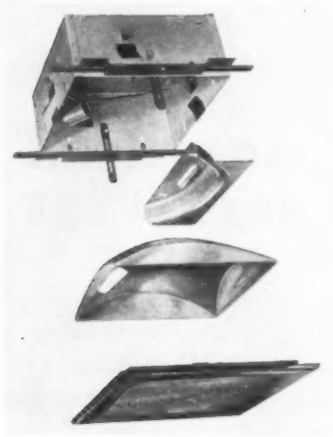
NEW BEAUTY. Simple, flowing lines blend with furnishings in any home. Quality Silvercraft enamel finish in a pleasing neutral shade. Handle is an integral part of metal cabinet, rolled back in a smooth spiral for comfortable carrying. Cannot become detached.

NEW EFFICIENCY. Functional, curved air flow passage. Reflector forward-thrust at the top to channel heated air OUT into the room. Grille opening on back of heater directs incoming air flow over sensitive bulb of high quality, liquid-filled thermostat . . . gives more accurate control. Warms rooms quickly and evenly by radiation and circulation.

EASY CLEANING. Simply remove 2 screws and grille lifts out for fast, easy cleaning.

For complete information, see your distributor or write
CAVALIER CORPORATION, Electric Heating Division
Chattanooga 2, Tennessee

Stay ahead with Cavalier . . . the pace-setting line of Quality Electric Heating Equipment that sells on sight!



Cleveland, Ohio. With this fast new system all wiring is done inside the box.

Building wires can be connected directly to wires in the heavy gauge splicing compartment where wiring is enclosed by Virden's patented "V-Guard." The housing may even be used as a raceway.

This Virden fixture is ideal for use in tight quarters in either old or new installations, indoors and out. In existing ceilings the fixture slips into an opening cut ⅛" larger than the fixture. It is held there snugly by special spring clips and mounting brackets. Three sizes and any combination of four trim colors and four lens styles are available.

For additional data, ask for item L-1022, using the coupon on page 106.

Wide-sweep floodlight for protective lighting

INTRODUCTION of its new #200F wide-sweep Fresnel floodlight has been announced by the Nepo Manu-

facturing Co., 4230 N. Sayre Ave., Chicago 34, Ill. This luminaire is used for maximum plant and property protection.

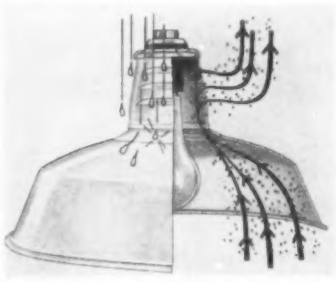
This type of luminaire is rapidly proving its superiority for protective lighting around factories, oil refineries, railroad bridges, reservoirs, industrial properties, airports, etc. The 180 degree beam provided by this type of lighting keeps possible intruders in bright glare without revealing movements of security personnel located behind the floodlights.

For additional data, ask for item L-1023, using the coupon on page 106.

Mercury lighting equipment and incandescents redesigned

A BROAD NEW LINE of incandescent and mercury lighting equipment said to offer industrial users the right unit for every incandescent and mercury lighting need is offered by the Miller Co., of Meriden, Conn.

Redesigned from top-to-bottom, the new Miller-Ivanhoe line features two



all-new mounting and socket assemblies, each of which greatly facilitates installation and maintenance. Other plus features are louvered, ventilated reflector necks to protect the lamp from moisture while providing a self-cleaning action. Steel reflectors are white porcelain enameled inside and out in keeping with the modern trend to lighter, more comfortable working environments in industry.

For additional data, ask for item L-1024, using the coupon on page 106.

Change-about colored panels in square ceiling fixture

JUST INTRODUCED by the Moe Light Division of Thomas Industries, 410 South Third St., Louisville 2, Ky., is a ceiling fixture designed to change colors to blend with the decor of any kitchen.

The fixture comes complete with three sets of plasticized "old-fashioned" gingham panels. All materials to change the side panels to any of three different colors are packaged with the fixture. The gingham panels are black and white, red and white, or yellow and white. The trim is polished chromium. The fixture is 14 inches square—big enough for the largest kitchen, yet graceful in appearance. It takes four 60 watt bulbs.

For additional data, ask for item L-1025, using the coupon on page 106.

Shallow weather-resistant square bowl ceiling unit

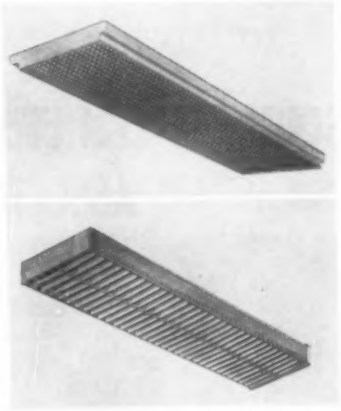
THE WEATHER-RESISTING construction of the new square bowl ceiling unit now offered by McPhilben Manufacturing Co., Inc., 1329 Willoughby Ave., Brooklyn 37, N. Y., makes it ideal for canopies, corridors, entrances, vestibules, shower rooms, etc. The unit projects 4¼ inches from the ceiling.

The hinged, cast-aluminum band is anodized for protection against normal weather conditions. Band containing 5/16" cast Carrara glass, swings to one side permitting easy relamping and cleaning. The 18 ga. zinc-clad bonderized formed steel backplate contains porcelain lamp holders to accommodate up to two 100-Watt lamps.

For additional data, ask for item L-1026, using the coupon on page 106.

Surface or pendant mounted thin fluorescent fixtures

THE SLIM DIMENSION series 20 and 21 fluorescent fixtures manufactured by the Ruby-Philite Corp., 32-02



Queens Blvd., Long Island City 1, N. Y., may be surface or pendant mounted.

Series 20 is 4 inches deep and is available in 4 and 8 foot lengths for 48 inch rapid start lamps or 48 and 96 inch slimline lamps—widths 2 lamp 11¾"; 4 lamp 21".

Series 21 is only 2⅞" deep and is available in 4 and 8 foot lengths for 48 inch rapid start lamps or 48 and 96 inch slimline lamps—widths 2 and 3 lamp 14¼"; 4 and 6 lamp 27".

For additional data, ask for item L-1027, using the coupon on page 106.

Fluorescents designed for concealed suspension ceiling

DESIGNED for installations in concealed-suspension ceiling systems utilizing accessible type tile, the series Sixty-Six fluorescent fixtures are offered by Litecraft Manufacturing Corp., 8 East 36th St., New York, N. Y. The fixture is available in two sizes (2' x 2' or 2' x 4'), and with two styles of plastic diffusers.

Utilizing the ceiling suspension system for total support—the integral self-aligning support arms of the

SOUTHEASTERN ELECTRICAL WHOLESALERS ASSOCIATION, INC.

P. O. Box 176—Ben Hill Station
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All Branches of the Electrical Industry Are Invited to Come South

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PLAN TO ATTEND THE

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To be held in conjunction with the SEWA Industry Day Meeting and sponsored by the Southeastern Electrical Manufacturers' Representatives Club.

Our speaker will be Leo P. Aikman, *Atlanta Constitution* columnist—he's hilarious and will have you rolling in the aisles.

Menu:

- Fruit Juice
- Southern Country Ham and Eggs
- Grits
- Hot Biscuits
- Coffee

Guests will be the SEWA members and their wives, so make your plans to attend.

Write for reservation.

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Tomorrow takes form in Curtis Visioneered Planned Lighting . . .

New Eye Comfort® Troffer . . . with L.B.Q. Louver . . .*
Years Ahead in Design—Performance

An eye to the future marks the difference between leadership and mediocrity in lighting design. The uniquely new Curtis Eye Comfort Alzak Aluminum Troffer is the first luminaire to have a *true parabolic-shaped fin*—the extruded L.B.Q. louver . . . heavy gauge aluminum fin, for durability, rigidity and strength. Curtis Eye Comfort Troffer offers highest level illumination . . . **low brightness quality* from all critical viewing angles . . . a troffer adaptable to all types of ceilings: plaster, metal pan, acoustical tile, inverted T-grid . . . new shallow depth which requires maximum recessing space of 6½" . . . ease of maintenance, relamping and cleaning. Great new Curtis Eye Comfort Troffer is just one more in a long line of Curtis "firsts" including the design and production of Alzak Aluminum Lighting Equipment; and *over 50 other* Curtis contributions to the lighting industry. Write today for a demonstration of the new Curtis Troffer with L.B.Q.

®TM Curtis Lighting, Inc.

CURTIS RECESSED LUMINAIRES provide high level general illumination, low-brightness quality in the American Hardware Mutual Insurance Company Building, Minneapolis, Minnesota. Architects: Thorshov & Cerny.

Curtis Eye Comfort Alzak Aluminum Troffer with L.B.Q. Louver Fin. Snap-on yoke and toggle bolts for easy application: New shallow depth . . . maximum recessing space required, 6½".

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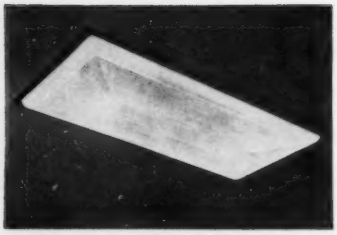


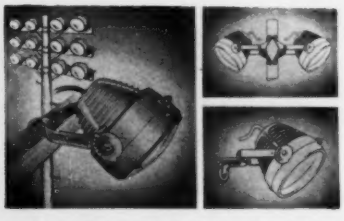
fixture assure straight and level mounting at all times. Shallow depth of fixture eliminates possibility of interference with duct work, etc., used above ceiling.

The fixture gives complete flexibility in application and installation, and remains completely accessible for maintenance and/or service at all times.

For additional data, ask for item L-1028, using the coupon on page 106.

Powerbeam floodlight for long-throw coverage

A HIGH POWERED floodlight designed for long-throw coverage of wide field areas has just been announced by Stonco Electric Products Co., 333 Monroe Ave., Kenilworth, N. J. Named the Powerbeam Sportslighter because of its particular adaptability to ball fields, driving ranges, stadiums and other open field areas, the new unit is smaller and much more compact than conventional floodlight



types, and is reported to offer higher lighting levels with lower initial equipment and maintenance costs than is normally possible with floodlights operating with general service lamps.

For additional data, ask for item L-1029, using the coupon on page 106.

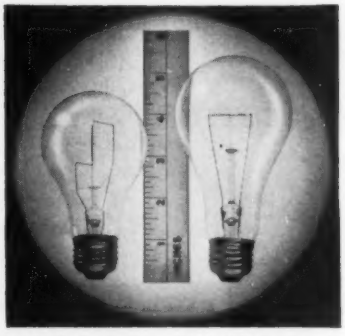
Smaller 100-watt bulb produces more light

DEVELOPMENT of a new 100-watt household light bulb, considerably smaller than the present lamp of corresponding wattage, producing six per cent more light, has been announced by the General Electric Co., Nela Park, Cleveland, Ohio. The new lamp will be identical in size and shape to that of the present 75-watt bulb (A-19).

The six per cent increased light output will, during the life span of the new bulb, be worth the equivalent of more than half the cost of the bulb.

Key feature of the new development, it was pointed out, is the successful application for the first time in a household lamp of the revolutionary "stand-up" or vertical filament announced by G. E. in December, 1955, for its new "Bonus Line" of large industrial and commercial incandescent lamps.

Among advantages seen for consumers, merchants, and fixture manufacturers as a result of the new reduced-size 100-watt lamp are: increased light output from existing portable lamps and lighting fixtures; more convenience and space saving; faster trend toward better portable lamps and fixtures having increased light output; reduced bulb blackening and improved lighting maintenance throughout lamp life.

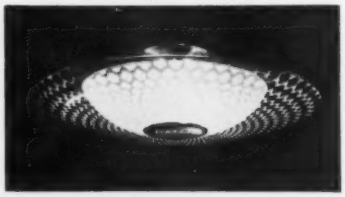


Reduction of the size of the 100-watt bulb by nearly an inch in length and a quarter inch in width was made possible by the vertical positioning of the filament. G-E engineers explained that if horizontal filaments were used in the smaller bulb they would cause lamp bases to operate at temperatures higher than would be safe.

For additional data, ask for item L-1030, using the coupon on page 106.

Glass-in-glass fixture has four-light cluster

A UNIQUE double glass technique adds a luxurious decorative dimension to the treatment and design of "close-to-the-ceiling" fixtures in a



new group called "Pacesetter" just introduced by Lightolier, Inc., Jersey City 5, N. J. This glass-in-glass treatment creates an intriguing interplay of light through a glowing opal inner globe and a delicate pattern screened on an outer clear glass form.

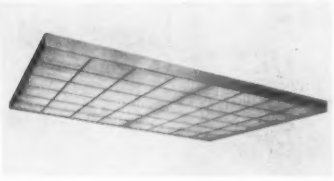
The "Pacesetters" produce abundant, glare-free illumination from a 4-light cluster. They are overscaled to assure a wide light area. Conveying no feeling of weight or bulk, they are in keeping with the trend towards luminous light sources and the airy mood that is favored in so many of today's interiors. A polished brass canopy and bottom plate add the finishing touch to these new fixtures.

For additional data, ask for item L-1031, using the coupon on page 106.

Floating panel luminaire for high level illumination

A REVOLUTIONARY new large area luminaire for high level illumination called Panelaire has been introduced by Lighting Products Inc., Highland Park, Illinois.

Panelaire is completely factory assembled as a single unit in nine different sizes from 2'x4' to 6'x8', packed and shipped in a single carton ready to install. By installing a series



of Panelaires, it is possible to illuminate an area of 12'x16' with only six single stems. Simplified lay-in features of the diffusers makes maintenance quick and easy without the use of tools.

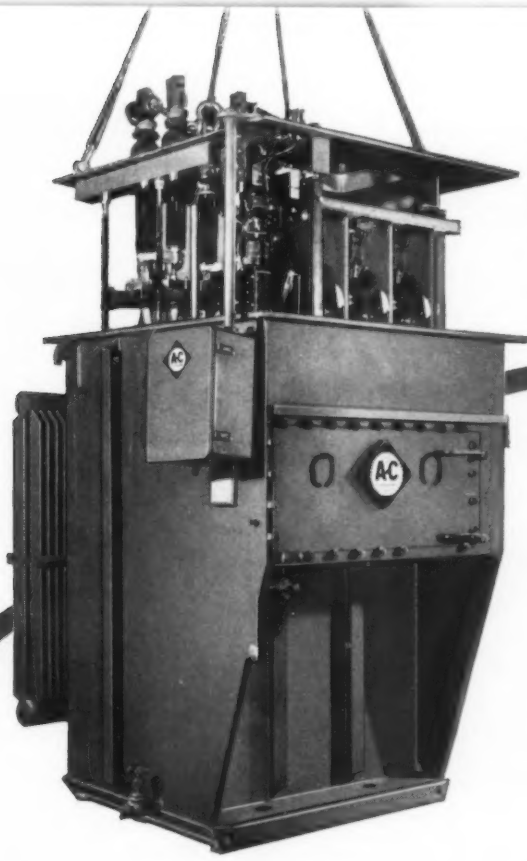
For additional data, ask for item L-1032, using the coupon on page 106.

Mechanical hand changes fluorescent lamps

A MECHANICAL HAND for changing fluorescent lamps is being manufactured by the Carl Ziese Mfg. Co., Route 2, Box 449, Oklahoma City 12, Okla. Promising to speed up maintenance of fluorescent lighting fixtures, the device can be used to replace all sizes or types of lamps and starters in fixtures up to fourteen feet above floor level without using a ladder.

With simple hand-operated controls, the mechanical hand firmly grasps the lamp, rotating the two pin

twist-out type from the sockets, or exerting pressure against the spring-loaded socket of the slimline type



reasons for remarkable service of ALLIS-CHALMERS 3-phase regulators

unit construction

Exclusive unit-type construction, with transformer and tap-changing mechanism mounted to the cover, offers these important advantages.

- Continuous leads pass directly from transformer coils to double-bolt terminals on dial switch to eliminate 78 electrical connections.
- Tap leads from winding are brazed to bus bars to give greater short-circuit strength.
- Double bolts secure bus bars to dial switch terminals. Vibrations will not loosen connections.
- All connections are made before unit is tanked, providing extra assurance of good workmanship.
- Accessibility of parts prior to tanking the unit allows precise inspections to be made.
- Untanking is easy — remove cover bolts and control compartment nuts and lift unit from tank.

These are only a few of the many outstanding features of Allis-Chalmers 3-phase regulators. For complete specifications call your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

A-5460

ALLIS-CHALMERS

and rotating the lamp away from the fixed socket for removal from the fixture.

With the addition of slip-on taper-fit receptacles, all sizes of starters can be removed and replaced in either vertical or horizontal mountings. It is designed to remove and re-install diffusers not secured by thumbnuts or threaded bolts where a wrench or screwdriver is necessary.

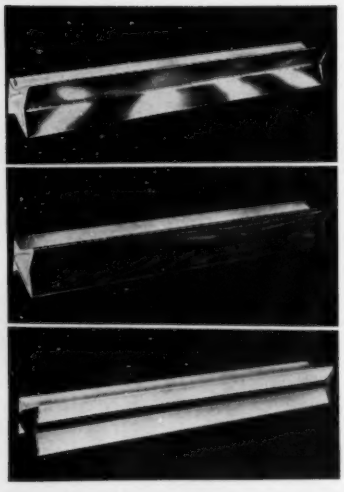
If the diffuser can be grasped and manipulated by hand, it may be removed and re-installed by the Mechanical Hand. The mechanical dexterity of the device is such that it can handle dust cloths or sponges in dusting or cleaning both lamps and fixtures.

For additional data, ask for item L-1033, using the coupon on page 106.

Baffled fluorescent wall lighting unit

CRISP AND FUNCTIONAL in styling, the Lyteline, manufactured by Lightolier, Inc., Jersey City 5, N. J., brings to commercial and residential interiors a custom-built look in wall lighting without custom-built installation or cost.

Lyteline is an elongated baffle (shield) behind which the fluorescent tube is set. Dimensions are six inches high, 48¼ inches wide, and extending



six inches from the wall. The shield is executed in walnut veneer or in satin brass with pin-point piercings for important decorative locations. Another version, finished in white enamel with grey center trim may be painted to match room colors.

More versatile than cove lighting, the Lyteline wall unit directs soft light upwards to wash wall and ceiling surfaces, and downward for direct illumination. This combination of general indirect and specific direct lighting is accomplished by means of the special V-shaped baffle which gives a 40° shielding angle.

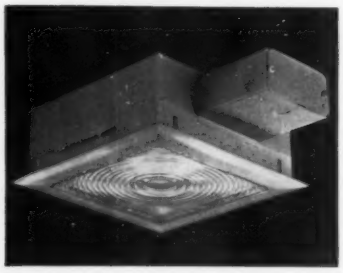
For additional data, ask for item L-1034, using the coupon on page 106.

Square 60 watt recessed fixtures

A COMPREHENSIVE new selection of square 60 watt recessed lighting fixtures has been added to the Atlite lighting equipment line. Produced by the Atlas Electric Products Co., 319 Ten Eyck St., Brooklyn 6, N. Y., the new line features one piece frames that are free of welding marks.

The housings are offered in three styles; unwired, unwired with an asbestos lining, and completely prewired. All units are equipped with fibre glass gaskets to seal out light leakage.

To make maintenance easier and to maintain a clean ceiling line all units feature new Torsion Spring Hinge



Frames. Frame attachments are completely invisible and can be opened quickly without any tools. Convenience is served too, with an open frame locking device that prevents the frame from falling or snapping shut.

For additional data, ask for item L-1035, using the coupon on page 106.

Lighting fixtures unify dining and kitchen area

TO PROVIDE unified design for new-home kitchen-dining and other areas where space limitations require a smaller lighting fixture in one room, Markstone Manufacturing Co., 1531 Kingsbury St., Chicago 20, Ill., has recently created a "companion" set of fixtures in two practical sizes.

Both three-light and two-light fixtures are a modern combination of non-glare opal glass with brass, cop-

per or triple plated chrome trim. The 12¼" fixture known as No. 910, takes three 60-watt bulbs. The 9" No. 912 uses two 40-watters.

High quality construction includes ceiling pans with Fiberglas insulation, white porcelain sockets with asbestos leads, and knockout for switch. Both fixtures project only four inches from the ceiling. Simplicity of design and high reflective efficiency afford proper lighting keyed to room areas.

For additional data, ask for item L-1036, using the coupon on page 106.

Pull-down and ceiling units added to lighting fixture line

TWO POPULAR DESIGNS for residential and commercial installations have

been introduced by the EJS Lighting Corp. of Los Angeles, 921 East Pico Blvd., Los Angeles 21, Calif.

The 4-light pull down fixture with fixture mechanism, is 21" diameter, over-all height 8½" and has a maximum extension from top position of 66". It is the open type direct and indirect full perforated Constellation Line fixture. The finial, holding sunburst acid etched diffuser, is a modern brass ring creation. Major perforations in the crown permits upward light.

The 3-light ceiling semi-flush mount fixture also gives both direct and indirect light and is fully perforated. The finial, preceded by a brass secure locking device, holds sunburst acid etched diffuser. This unit is 12" in diameter and with an over-all height of 5½".

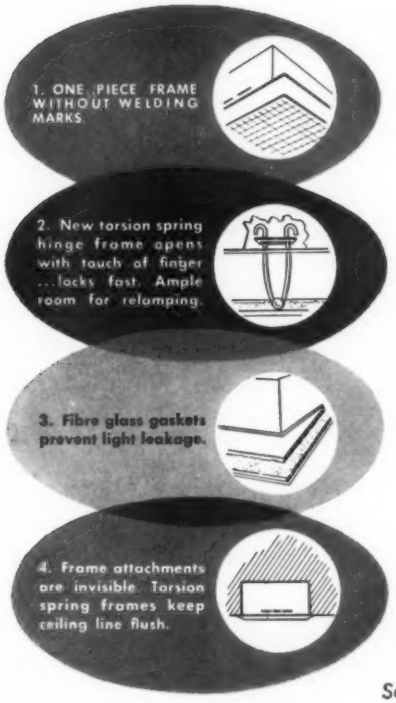
For additional data, ask for item L-1037, using the coupon on page 106.

Phosphorescent material identifies multiple switches

A "GLOWING" SWITCH has been added to the low-voltage line of The Remcon Division of Pyramic Instrument Corp., 630 Merrick Rd., Lynbrook, N. Y. Made of phosphorescent material, the new switch emits a soft velvety glow which pinpoints the location of the switch even in a completely darkened room.

The silent, butterfly shaped switches are available in combinations of one to four switches on a standard size wall plate as well as on Remcon's unique eight-position master control. This provides multiple light control at all room entrances enabling the home owner to turn on lights ahead and turn off lights behind at each switch location.

Although there may be as many as four switches on a plate, there's no chance of "dark room fumbling" or selecting the wrong switch because the phosphorescent material pinpoints each switch on the plate. They are available in buff color or clear, for


1. ONE PIECE FRAME WITHOUT WELDING MARKS.
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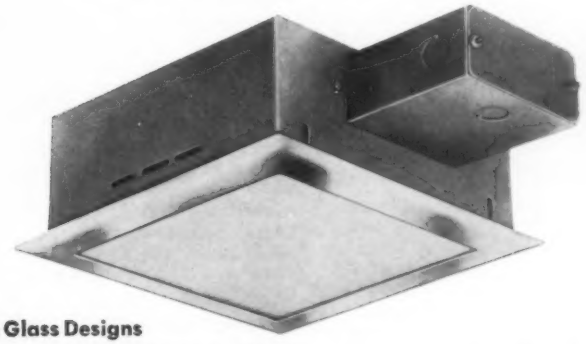

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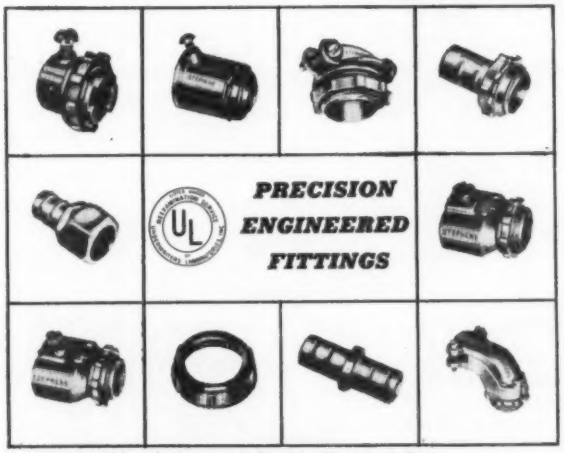

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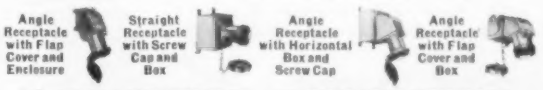
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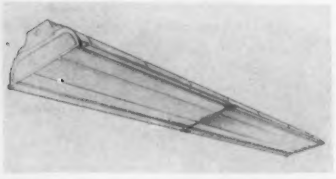
inserts of matching paint, wallpaper, or upholstery and drapery swatches.

For additional data, ask for item L-1038, using the coupon on page 106.

Industrial light fixtures utilize higher output

DAY-BRITE Lighting, Inc., 5411 Bulwer Ave., St. Louis, Missouri, announces a new line of industrial fixtures utilizing the higher light output

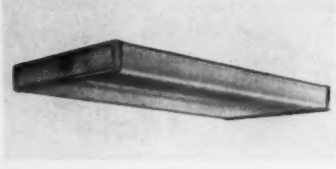


of eight-foot Power-Groove lamps. Called CFI-15, CFI-20, CFI-30 and CFI-30L, the new series has all of the company's "Comfort for Industry" industrial lighting features, including closed-end lifetime porcelain enamel reflectors with reinforcing ribs and embossed apertures.

For additional data, ask for item L-1039, using the coupon on page 106.

Surface or pendant mounted commercial fluorescent

IN THE QUENTIN, the Fullerton Manufacturing Corp., P. O. Box 110, Norwalk, Conn., has built extreme shallowness into a completely shielded luminous fluorescent fixture. The



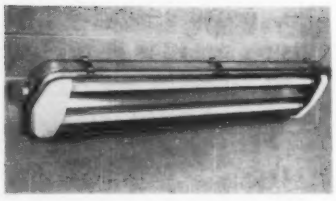
wrap-around plastic enclosure of "Everwhite" ultra-violet resistant polystyrene provides lighting of high efficiency with extremely low brightness. The even spread of light, with no dark spots, over the entire fixture length belies the shallow 3¾ inch fixture depth. Balanced diffusion of light minimizes ceiling contrast.

The Quentin has broad commercial application. Surface mounted you get lighting at the finest in low ceiling areas. May also be pendent mounted with apertured top supplied where uplight is desired. Choice of 24, 48 and 96 inch lengths with 9⅝ and 12 inch widths for 2 and 4 lamps. May be mounted individually or in rows or patterns.

For additional data, ask for item L-1040, using the coupon on page 106.

Two-lamp fluorescent floodlight luminaires

AVAILABLE in four- or six-foot lengths, the two-lamp fluorescent floodlight luminaires designed to ac-



commodate either present standard of future higher output lamps are available from Line Material Industries, Milwaukee 1, Wis.

The new units achieve the same high optical efficiency as L-M's recently announced 4-lamp fluorescent luminaires. They will serve effectively in such applications as airport ramp, dock, railroad underpass, tunnel, or substation lighting. Units can be mounted singly, or in "Vee" or "Delta" combinations.

For additional data, ask for item L-1041, using the coupon on page 106.

Photoelectric light control for outdoor applications

A PHOTOELECTRIC light control for highways, airports, industrial areas, and outdoor signs has been announced by the Photoswitch Division of the Electronics Corporation of America, Cambridge 42, Mass.

This light control provides positive, reliable, automatic on-off control of any lighting system whose operation should be related to outdoor light conditions. The control reacts automatically to actual daylight intensity and therefore is unaffected by seasonal changes, weather, or time of day—the lights go on whenever they are needed.

Reliability is provided by advance circuitry requiring only a single amplifier tube. Top quality components operate at a fraction of their ratings, assuring stable, dependable operation and long, trouble-free life. Time-tested electronic components are mounted on a printed circuit base.

For additional data, ask for item L-1042, using the coupon on page 106.

Outdoor displays lighted with fluorescent fixture

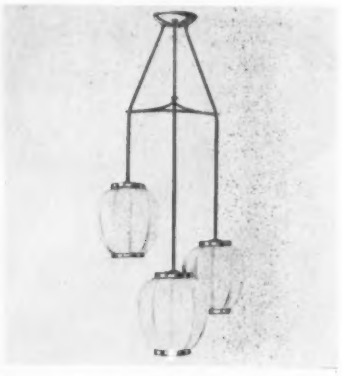
AN OUTDOOR fluorescent lighting fixture produced by Revere Electric Mfg. Co., 6009 Broadway, Chicago 40, Ill., is now available for illuminating poster panels, painted bulletins, pole signs, store fronts, walls and other vertical surfaces.

Component reflectors are available in 4, 6 and 8 foot lengths. From a small group of basic components, reflectors may be installed singly or in combination to cover any given poster length. Where an unusually large area is to be illuminated, double rows of fixtures may be installed.

For additional data, ask for item L-1043, using the coupon on page 106.

Adjustable bubbles form clustered fixture

A CLUSTER of three small white vinylite bubbles giving soft over-all light and directing extra light downward combine with polished brass



trim in the newest fixture available from Moe Light Division of Thomas Industries, Inc., 410 S. Third St., Louisville 2, Ky.

Each bubble is individually adjustable to 42 inches maximum over-all length. The bubbles are 10 inches long and 8½ inches in diameter. Fixture takes three 60 watt bulbs. Fixture number M-1407 retails for approximately $29.95.

For additional data, ask for item L-1044, using the coupon on page 106.

Automatic closet light reduces installation time

THE MAKERS of Remcon low-voltage switches are now offering their new automatic "Closet-Lite," available from Pyramid Instrument Corp., of Lynbrook, N. Y.

Every Closet-Lite contains its own built-in transformer. No heavy armored cable is required, #18/2 wire is used throughout. It eliminates the labor involved in cutting out and installing a box in the door jamb. The

manufacturer reports that the time saved by the contractor equals more than half the time required to install other automatic lights for closets, and that contractor profits increase proportionately.

For additional data, ask for item L-1045, using the coupon on page 106.

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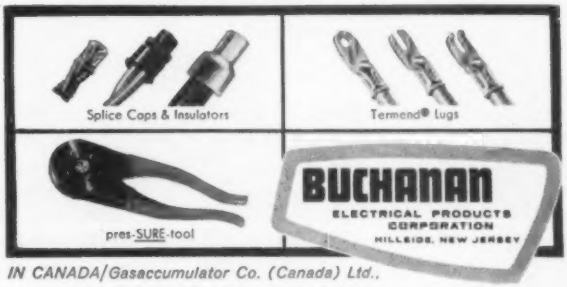

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News of the industry

edited for Southern readers

FAEC anticipates 1,000 at St. Petersburg show

MORE than 1,000 electrical contractors and guests are expected to attend the Florida Association of Electrical Contractors annual convention and fifth Electrical Trade Show at St. Petersburg October 16-19, according to FAEC President James Dandelake. Theme of the meeting, to be held at the Soreno Hotel, will be "Forward: Electrical Florida," President Dandelake said.

Said to be the largest electrical product show yet to be staged in Florida, the show's electrical material manufacturers in attendance will present a broad variety of new products, along with up-to-the-minute applications. Exhibitors will make their exhibit booths special consultation and conference quarters for application engineering counsel, Dandelake said.

During the meeting, the FAEC will act as host to Florida architects and electrical engineers at a special luncheon, with the afternoon set aside for their review of the trade show as guests of the exhibitors.

Westinghouse announces new fluorescent lamp

THE DEVELOPMENT of a new fluorescent lamp which produces two and one-half times more light than standard fluorescent lamps has been announced by Westinghouse.

The "Super-Hi" fluorescent lamp uses a mixture of rare gases to obtain long cathode life and to maintain high brightness during the life of the lamp. The tremendous brightness of the new "Super-Hi" fluorescent lamps is obtained in the same conventional sized tube (T12) as present day lamps.

The "Super-Hi" lamps embody new principles of design which permit extremely high energy loading of electrodes, the arc stream and the phosphor. This design means that the extremely high light output can be obtained without sacrificing good efficiency and long life for the lamp.

The high light output of the "Super-Hi" lamps means that fluorescent lamps may now be used in important industrial and outdoor lighting applications, such as street, highway, and parking lot illumination and billboard lighting.

The "Super-Hi" fluorescent lamps should result in important space and dollar savings, it is said. Where today, four ordinary fluorescent lamps may be required for a particular application, only two "Super-Hi" lamps would be required and the fixture used would be of conventional size.

With cooling chambers located at each end of the lamp and the use of continuous filament heating, the new lamps are said to have excellent starting and operating characteristics. Available in 48″, 72″ and 96″ sizes, the lamps are rated at 6,000, 9,300, 13,000 initial lumens respectively. They will be available initially in cool white, produced with recessed double contact bases.

Contributing to the output of the "Super-Hi" lamps is the use of new "Ultralume" high-output fluorescent phosphors, developed by engineers of the Westinghouse lamp division. The new phosphors were designed to provide greater light output and improved fluorescent lamp maintenance.

Southwire lowers prices to peg price level

A GEORGIA aluminum wire fabricator has cut list prices in an attempt to stabilize prices.

Such was the information furnished this publication by telegram on September 7 by the Southwire Company of Carrollton, Ga. The wire, in part, stated:

" . . . These new sheets establish a price level more nearly in line with those actually being quoted. ACSR prices are down 3-cents and covered wire 15 to 20%.

"The price confusion in the industry today has created unfair pricing situations, Southwire, in the interest of providing all our

The new Westinghouse Super-Hi fluorescent lamp, held at left, which utilizes a mixture of rare gases to obtain its remarkable brightness, actually produces as much light as two-and-a-half standard lamps.

customers with a consistent and stable price, publishes these sheets with the hope that confidence on the part of all aluminum wire buyers will be re-established.

"As a non-integrated fabricator, Southwire Company is taking this unprecedented step in spite of a profit margin already unrealistically low because of increased raw material and production costs.

"The new sheet will become effective on all shipments made on or after September 9."

National lighting show set for NYC in March '58

THE FIRST National Lighting Exposition, to be held in New York City March 9-12, 1958, will mark the initial time in history that every conceivable type of lighting and lighting equipment will be on display under one roof.

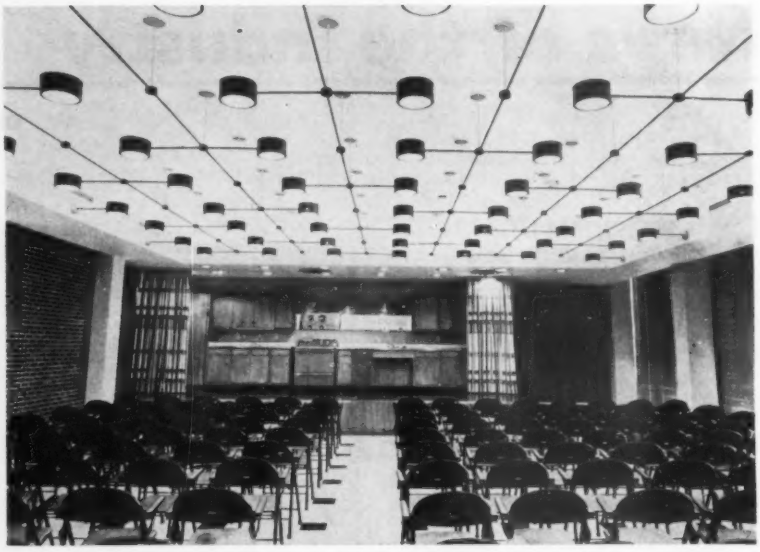
That is the opinion of Exposition President Harold Meyer, representing the Lighting Lamps and Electrical Manufacturers Salesmen's Association, sponsor of the show, who stated that the event will "bring national attendance in contact with the newest and most modern advances in each of the diverse fields of a many-pronged industry."

In addition to exhibits sponsored by various companies, the exposition will "dramatically show the history of lighting from ancient days until the present," Meyer said. Universities throughout the country have been invited to participate in the event, to be staged in the New York Coliseum, in order that those interested in lighting have a broader view of its scope.

Skinner sees numerous NEW committees in 1958

AT LEAST 250 state and local National Electrical Week committees, representing thousands of cities and towns throughout the United States and Canada, will participate in the week's fourth annual observance next February 9-15, according to NEW Chairman Merrill E. Skinner.

Skinner, vice-president and sales director for Union Electric Company in St. Louis, reported that the national NEW committee received detailed reports on the 1957 observance from 177 state and local committees in 40 states, five Canadian provinces, the District of Columbia, and Hawaii. In some instances, an individual report covered NEW activities in more than 200 cities and towns.



ATTRACTIVE LIGHTING INSTALLATION—Auditorium lighting of the Home Economics Department of East State Teachers College, Commerce, Texas, was supervised by Julius Dry of Superior Electric. Litecraft fixtures supply an average of fifty footcandles of illumination.

"The many excellent suggestions and successful activities in these reports will form the basis for our 1958 NEW planning guide and kit of materials to be distributed throughout the electrical industry this October," Skinner said. "Our advance contacts indicate we will have at least 250 state and local committees formed for the 1958 observance."

NEW is sponsored, with financial support, by eleven principal trade associations in the electrical industry, representing utilities, manufacturers, distributors, contractors, dealers, inspectors, leagues, and electrical workers. It is endorsed by fifteen other associations.

Skinner said the basic purpose of NEW would be unchanged for the 1958 observance—"to focus attention on the contributions of electricity to our way of life."

"It will be carried out as an umbrella activity, with strong support from national advertisers," he said, "to provide a beginning-of-the-year springboard for the various programs and educational or promotional objectives of our industry.

"Its principal function is to provide a stage upon which each group and company within the industry can produce an information job of particular importance to its primary interest—whether that interest be in the field of improved wiring, a company's community relations, employee morale, the sale of merchandise, or whatever.

"The great value of NEW lies in its cumulative impact, with all the many and varied activities that are carried on simultaneously in early February each year," Skinner concluded.

City of Atlanta adopts new code

EFFECTIVE September 1, the City of Atlanta adopted the 1956 edition of the National Electrical Code and made certain changes in the special rules of the City Code, according to Dewey L. Johnson, superintendent of electrical affairs for the city.

Special City Code rules that have been in effect since 1954 have been amended as follows:

(1) In all occupancies other than single family and multi-family dwellings, the unit loads specified in Column A, section 2203, shall be increased by 25%, and in no case shall the connected load exceed 80% of the rated capacity of the branch circuit conductors. The requirement for appliances 2203-C-1, 1956 edition of the National Electrical Code, shall be 3,000 watts.

(2) The appliance circuit required, section 2115-B, 1956 edition of the National Electrical Code, shall serve not over 25 lineal feet of baseboard in the kitchen. In the pantry, dining room, and breakfast room the circuit shall serve not over 50 lineal feet.

(6) The 3-pole type receptacle required in section 2124-B, of the 1956 edition of the National Electrical Code, for laundry equipment shall be installed in the laundry

room where one is provided; if no laundry room is provided, the receptacle shall be installed in the kitchen and shall be served by an individual branch circuit.

(13) Residences of more than 800 square feet area shall have the service conductors not smaller than No. 2, and service switch or circuit breaker not smaller than 100 ampere.

(34) Armored cable shall not be used for motor installations ⅓ hp and larger except motors 1½ hp or less in existing residences for attic fans and air conditioning.

(54) Switches for motors larger than 2 hp shall be Type N.D. or H.D.

(80) All outside box signs shall have approved electrode receptacles. Bushings or double-back electrodes will not be approved except double-back electrodes on panel type signs approved by special permission only.

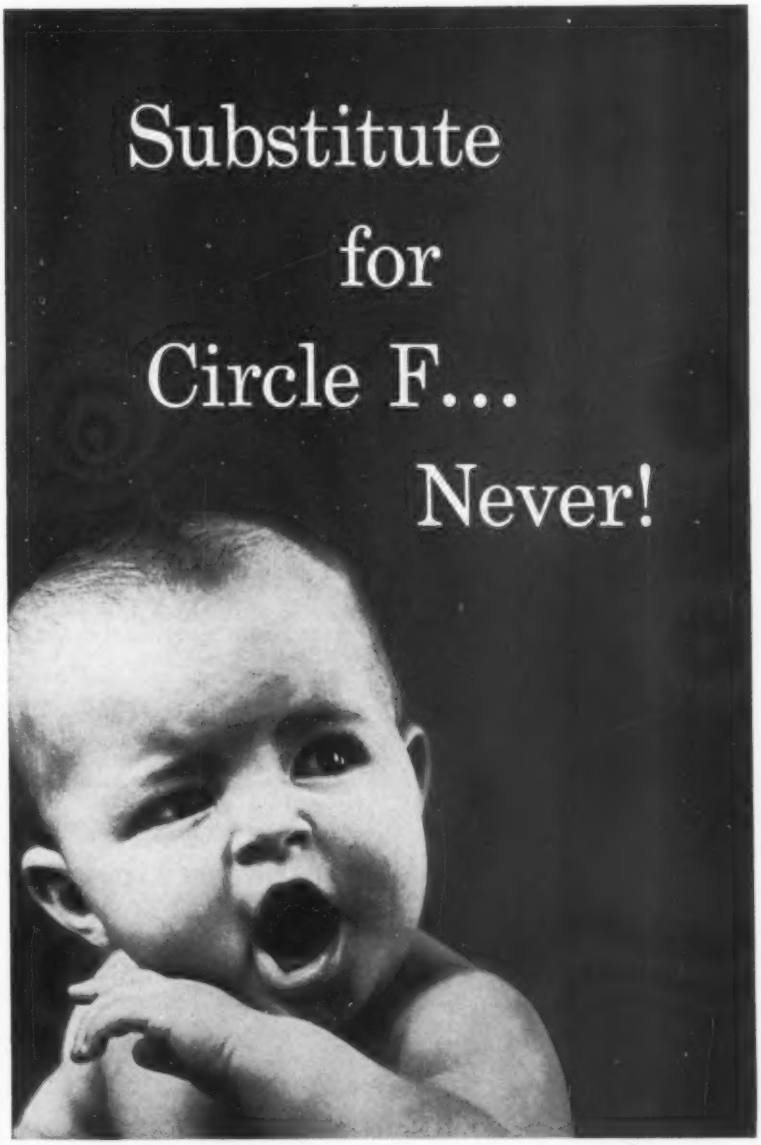
Shattuck receives medal for firm's safety record

CONSECUTIVE man-hours totaling 250,000 without a single lost-time accident. That was the enviable safety record recently established by the Coast Electric Power Association of Bay St. Louis, Miss., over a period of almost three years, and for which company Manager H. H. Shattuck received a silver medal on Labor Day by the Employers Mutual Insurance Company of Wausau, Wis.

Presentation was made at the annual Coast Electric picnic, attended by some 140 employees and their families. Presenting the medal to Shattuck was Gilbert B. Fletcher, safety engineer, who stated: "A successful program such as yours proves to organizations like mine that wherever there is a good safety program, you will find highly competent employees. One follows the other, and you should be proud to know that you are a part of one of the most competent working organizations that can be found anywhere in the nation."

NFPA committee releases code revision calendar

A CALENDAR for revising the current edition (1956) of the National Electrical Code as recommended by the Correlating Committee of the NFPA National Electrical Code Committee has been released by the National Fire Protection Association. The stages through which proposed changes in the 1959 edition of the code are to be processed and considered will be as follows:



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Dec. 31, 1957—Final date for receipt of proposals for revisions.

Jan.-May 1, 1958—Panel reports will be made to the Correlating Committee which will prepare an informal report to the Electrical Section meeting in May, 1958.

July 1, 1958—Panel reports will be published for distribution to the Electrical Section members and others.

July 1 - Dec. 1, 1958—Period for study by electrical industry and recommendations to Panels for changes.

Jan. 30, 1959—Code - Making Panels make final report to Correlating Committee after consideration of industry comment.

March 20, 1959—Correlating Committee submits proposed changes to NFPA for printing and distribution.

May, 1959—Review by Electrical Section at NFPA annual meeting. NFPA acts in annual meeting, and may refer to Board of Directors for approval. Submittal to American Standards Association for status as American Standard.

Sept., 1959—Publication of new code.

Sam Resnick acquires Eastern Fixture Co.

THE EASTERN Fixture Company of Boston, Mass., commercial and industrial fluorescent lighting fixture manufacturer, has been purchased outright by its president, Sam Resnick, who recently acquired the interests of former firm associates David and Louis Gilman. Resnick has announced expansion of the 18-year-old firm, along with introduction of three new fixture models.

The new two- and four-light units, to be on the market within three months, have been designed for shallowness and width-spread of light and will feature plastic lens and egg-crates, popular in other Eastern fixtures, Resnick indicated. The firm's products are sold through electrical wholesalers only.

Crichton establishes Florida rep business

BILL CRICHTON, formerly with L. Morris Landers Co., Atlanta, has established a manufacturers' representative business in Florida with headquarters in Riverview.

Among lines handled, Crichton reports, are those of Clifton Conduit and Wire Co., and Rattan Manufacturing Co. He will represent both in the wholesale trading areas of Tampa and Jacksonville.

Institute establishes new lighting standards

PRACTICAL STANDARDS for minimum quality lighting in the nation's homes were recently announced by the American Home Lighting Institute, trade association of residential lighting fixture manufacturers and distributors.

At the same time, the Institute also announced its Light for Living award program, which will give recognition to home builders who install adequate lighting.

Called the Light for Living standards, the new guides are expected to end the confusion about home lighting that previously existed in the minds of distributors, contractors, architects, builders, and consumers. Experts from every area of the lighting industry helped compile these standards.

In addition to outlining general and specific area lighting requirements for the home, the standards describe desirable fixtures and outlets to assure the comfort and safety of the home owner.

The standards are simple and minimum and are boiled down to the point where they take up only a single page. Distributors and some utilities are mailing them to thousands of contractors and builders.

They provide a specific package for the distributor, contractor and public utility representative in selling improved lighting for new homes or modernization jobs.

"We hope it will no longer be necessary to talk vaguely in terms of what fixtures are needed in a particular home for minimum lighting," stated Ted Cox, managing director of the Institute. "The standards will provide a definite starting point toward full light conditioning."

According to Mr. Cox, the Light for Living standards will give home builders a "plus" value to aid in selling homes.

Builders who install fixture lighting according to the new standards are eligible for a Light for Living award certificate. These will be provided on receipt of a certifying letter from the local electric utility, stating that the builder has followed the standards.

"The Institute will then send certificates to the builder which can be displayed in the home and sales office, telling home viewers that the particular home has met all requirements for safe, comfortable lighting," Cox said.

A national promotion program has been scheduled for the new standards, with manufacturers,

MINIMUM† LIGHT FOR LIVING STANDARDS

GENERAL REQUIREMENTS:

1. All interior fixtures shall provide suitable shielding to prevent glare unless placed out of the line of vision.
2. A minimum of one ceiling fixture shall be controlled by a wall switch at the room entrance. Where ceiling fixture is not installed a minimum of one wall bracket, valance, cove or cornice lighting unit must be wall switched at the room entrance.
3. Where traffic pattern into a room is from two directions and more than ten feet apart, three-way control on general lighting is desirable.
4. Recessed fixtures to accommodate 150 watts of incandescent or 80 watts of fluorescent tubes may be substituted where ceiling fixtures are required in these standards.

*Items marked with an asterisk (*) are desirable and will add safety and comfort in addition to the sale and resale value of the home.

LIVING AREAS

1. Living areas within the scope of this standard include the living room, dining or dinette area, recreation, den, bedroom, study, library, reception hall, sun room, enclosed porches at .. other living areas not specifically covered. One of the following methods of illumination shall apply to each of the above areas:
   - A. A minimum of one ceiling fixture to accommodate at least 150 watts of incandescent;
   - B. A minimum of 60 watts (approximately 6 feet) of fluorescent lighting in valance, wall brackets, cove or cornice;

*A combination of A & B is desirable.

*Separately switched lighting for planned work, dining and recreation areas are desired.

KITCHEN AREA:

1. A minimum of one ceiling fixture to accommodate at least 150 watts of incandescent or 80 watts of fluorescent tubes.
2. One wall bracket or ceiling fixture above eating area within the kitchen.
3. One fixture above the sink.
4. Over the range and under cabinet lighting is recommended if these areas are not properly lighted from other sources.

†The above minimum standards for 1957 have been approved by the American Home Lighting Institute, working with lighting engineers, utility representatives and other authorities. To provide good lighting they must be laid out correctly . . . for maximum effectiveness and beauty. Remember, these are only minimums—a starting point toward genuine light conditioning.

HALLS—PASSAGEWAYS:

1. For each hall or passageway a minimum of one ceiling fixture, wall bracket, or 20 watts of fluorescent lighting shall be installed. One such fixture is required for every 15 feet of hall or passageway.

*A recessed fixture to accommodate 100 watts of incandescent is acceptable.

BATHROOM AND LAVATORIES:

1. One of the following methods for illumination should be used:
   - A. One fixture located on each side of grooming area and one fixture located on ceiling or wall over grooming area;
   - B. When wall to wall mirrors are installed adequate illumination should be used over full length of mirror.
2. A vaporproof fixture should be installed in the tub or shower area when in separate enclosure.

LAUNDRY-UTILITY-WORKSHOP-BASEMENT AREAS:

1. A minimum of one ceiling or wall fixture for each principal work area.

STAIRWAYS:

1. A wall or ceiling fixture shall be installed to provide adequate illumination for each stair flight.

FULL DOOR CLOSETS:

1. A minimum of one fixture for each full door closet where arrangement permits.

ACCESSIBLE UNFINISHED ATTIC AND STORAGE AREAS:

1. A minimum of one ceiling fixture or wall bracket.

GARAGE OR CARPORT:

1. A minimum of one ceiling fixture or wall bracket.

*One fixture for each parking area is recommended.

OUTSIDE THE RESIDENCE:

1. A minimum of one or more fixtures at each entrance of the residence.

*One or more directional fixtures or post lanterns are desirable for protective lighting, yard and driveway entrance areas. These should be controlled inside residence.

*One or more weatherproof outlets are desirable for yard maintenance, holiday lighting or for outside appliance use. One or more of these should be controlled inside the residence.

These are the new minimum Light for Living standards, recently announced by the American Home Lighting Institute. Actually, they are considered as only a starting point toward genuine light conditioning.

distributors, and utilities participating, he said.

Copies of the Light for Living standards are available in quantity at cost from the American Home Lighting Institute, 360 N. Michigan Ave., Chicago 1, Ill.

Wells Electric Supply reopens following fire

DESPITE A fire which destroyed its lighting department in August, the Wells Electric Supply Company reopened for business six days later.

"Our good suppliers of commercial lighting made rush shipments to us reaching us in time for reopening," reported President T. H. Wells, Jr., of the Birmingham, Ala., wholesale distributing firm.

The Wells building was divided by a brick wall, equipped with automatic closing fire doors. While the entire stock of residential and commercial fixtures and some supply inventory on one side of the building were destroyed, the office, records, city sales counter, and supply inventory on the other side were not damaged. A large part of the loss was covered by insurance, Wells said.

NAED names Southerners as committee chairmen

THREE Southerners have been named by the National Association of Electrical Distributors as chairmen of NAED committees.

They are W. H. Butt, president, Butt's Electrical Supply Co., Charleston, S. C., Junior Achievement Committee chairman; Wallace P. Covington, president, Ace Electric Supply Co., Jacksonville, Fla., Industrial, Commercial and Outdoor Lighting Committee chairman; and James E. Jacob, Raybro Electric Supplies, Inc., Tampa, Fla., Electrical Raceways Committee chairman.

These committees are three of 14 commodity and eight general committees of NAED which are actively engaged in improving the functions and services performed by the electrical distributor.

Standard appoints Georgia representative

Curtis W. Lehner, 203 Walton Building, Atlanta, Georgia, has been appointed sales representative for The Standard Transformer Company, of Warren, Ohio, in Georgia and Eastern Tennessee.

"Triple-A" Approval

IDEAL Wire-Nuts®

Patented 1,933,555

THE SOLDERLESS, TAPELESS WIRE CONNECTORS

are approved for 600-V. use

As pressure cable connectors for branch circuit wiring, appliance and machine hook-ups, fixture hanging, etc. (Contractor sizes 74-B and 76-B comply with Sec. 1115, N.E.C.)

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by owners, architects and engineers as evidence of quality in wiring jobs.

moral: IT JUST MAKES GOOD DOLLARS AND SENSE TO USE IDEAL "WIRE-NUTS" ON ALL YOUR WIRING JOBS.

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Please send catalog on Ideal "Wire-Nuts" Connectors.

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Canadian Distributor: IRVING SMITH, LTD., Montreal

Family room lighting to be featured by GE

"LIGHT FOR LIVING" in the family room will be featured in a national advertising campaign to be launched this fall by the Large Lamp Department of the General Electric Company.

The campaign will get under way with a two-page, four-color spread in the October issue of Better Homes and Gardens Magazine, and will be featured on the October 8 and November 5 Lamp Division "Cheyenne" television shows.

The advertising program will be used to illustrate how lighting can be used as a decorating medium to obtain maximum use of the family room, an area of the home that is rapidly becoming the most important center for family activities.

A special family room setting integrating lighting and decorating was created for the campaign by Eugene W. Commery, G. E.'s residential lighting authority, and C. Eugene Stephenson, noted New York interior decorator. The two men are co-authors of the best-seller, "How to Decorate and Light Your Home."

The lighting design to be shown in the family room centers around the use of G. E.'s Coloramic incandescent lamps and Home-Lite fluorescent tubes.

The illustrations used will be the first showing of an application for the company's recently-announced Home-Lite tubes, which are being recommended for use in the home to achieve the same flattering effect on furniture, drapery and complexions as is obtained with incandescent light.

King said the lighting fixtures used in the new family room design are a new concept for area lighting. They are a development of the popular luminous ceiling.

Dates Ahead

Southern Section, IAEI, Annual Meeting, Dinkler Plaza Hotel, Atlanta, Ga., Oct. 14-16, 1957.

Georgia Chapter, IAEI, Annual Meeting to be held with Southern Section Annual Meeting, Dinkler Plaza Hotel, Atlanta, Ga., Oct. 14-16. Business session 4:30 p.m., Oct. 14.

Southeastern Electric Exchange, Sales Conference, Tutwiler Hotel, Birmingham, Ala., Oct. 16-18.

National Rural Electric Cooperative Assn., Region II, Henry Grady Hotel, Atlanta, Ga., Oct. 17-18, 1957.

Florida Assn. of Electrical Contractors, Annual Convention and Trade Show, Soreno Hotel, St. Petersburg, Fla., Oct. 16-19, 1957.

Edison Electric Institute, Transmission and Distribution Committee, Statler Hotel, Boston, Mass., Oct. 17-18, 1957.

Oklahoma Utilities Assn., Electric Light and Power Division, Western District Conference, Woodward, Okla., Oct. 24, 1957. Eastern District Conference, Bartlesville, Okla., Oct. 25, 1957.

Tenth Annual Power Distribution Conference, University of Texas, Austin, Texas, Oct. 28-30, 1957.

National Rural Electric Cooperative Assn., Region X, Baker Hotel, Dallas, Tex., Nov. 7-8, 1957.

Institute of Radio Engineers, Annual Instrumentation Conference and Exhibit, Biltmore Hotel, Atlanta, Ga., Nov. 11-13, 1957.

National Electrical Manufacturers Assn., Annual Meeting, Traymore Hotel, Atlantic City, N. J., Nov. 11-15, 1957.

National Electrical Contractors Assn., Annual Convention, Cincinnati, Ohio, Nov. 13-16.

American Institute of Electrical Engineers, Sixth Annual Textile Applications Conference, North Carolina State College, Raleigh, Nov. 14-15, 1957.

Southeastern Electrical Wholesalers Assn., 8th Annual Industry Day Meeting, Biltmore Hotel, Atlanta, Ga., Jan. 29-31, 1958. M. L. Tice, Exec. Vice-Pres., P. O. Box 176, Ben Hill Station, Atlanta 11, Ga.

American Institute of Electrical Engineers, Winter General Meeting, Hotel Statler, New York, N. Y., Feb. 2-7, 1958.

Oklahoma Utilities Association, Annual Convention, Biltmore Hotel, Oklahoma City, March 27-28, 1958.

American Institute of Electrical Engineers, Southwest District Meeting, Tulsa, Okla., March 31-April 2, 1958.

American Institute of Electrical Engineers, Middle Eastern District Meeting, Washington, D. C., April 28-30, 1958.

American Institute of Electrical Engineers, East Central District Meeting, Huntington, W. Virginia, May 13-15, 1958.

I-T-E announces new terms of sale

THE I-T-E Circuit Breaker Co., Philadelphia, Pa., manufacturer of electrical power equipment, recently revealed plans to adopt terms of sale and shipment more favorable to purchasers of equipment sold for extended delivery.

The company will adopt price escalation terms on all new orders with extended delivery, whenever practicable, based upon published Government indices for labor and material.

The former escalation policy based on "price at time of shipment" has become increasingly unpopular and this type of escalation, administered by the manufacturer, is not applicable to today's market conditions, I-T-E officials report.

Coincident with its introduction of new terms of sale, the company also announced price increases in certain of its product lines, including high voltage switchgear, high voltage unit substations, isolated-phase bus and power switching equipment. These price increases will range from two to seven per cent.

In order to limit the effect of the price increases on unshipped orders that are subject to price escalation based on "price at time of shipment," I-T-E will advise those customers who are eligible for an adjustment.

Circle F Mfg. designates Sullivan for Virginia post

A. E. CLAUS, sales manager for Circle F Mfg. Co., Trenton, N. J., has announced appointment of W. E. Sullivan, Jr. to handle distributor sales of the firm's line of wiring devices in the state of Virginia.

Headquarters for Sullivan will be at 6211A West Broadstreet Rd., Richmond 26, Va.

Howard Electric sold to National Supply

THE HOWARD ELECTRIC Company of Dallas and Chicago has been sold to the National Supply Company, it has been announced by William Kearney, who was president of Howard Electric. Contract for the sale of the plants, all equipment, patents, everything, was signed recently, said Mr. Kearney, and the new owners took possession August 1.

Kearney said the consideration was in the neighborhood of one million dollars. There was no interruption in the Howard plants since National Supply retained all personnel.

Kearney, who is also president of The Kearney Company, manufacturers' representatives, will continue to represent the products of the plant he founded and developed in Texas and part of Arkansas.

Howard Electric is best known as the manufacturer of "Howarduct," a standardized underfloor wire distribution system for carrying power lines, telephone lines, and signalling circuits in office, commercial, and industrial buildings.

National Supply is a major producer of welded steel pipe and electrical conduit through its Spang-Chalfant Division.

Standard appoints Byrd as Carolina representative

WILSON P. BYRD, Westbridge Rd., Greensboro, North Carolina, has been appointed sales representative for the Standard Transformer Company, of Warren, Ohio, in the area of North and South Carolina. He will handle the complete line of Standard Transformers.

NECA elects officers in South Louisiana

ELECTED president of the South Louisiana Chapter, Inc., National Electrical Contractors Association, recently to serve for a one-year term was E. J. Larmann, Ship's Electric Service. Walter J. Barnes, Walter J. Barnes Electric Co., was named vice-president; R. C. Pflueger, Jr., Pflueger Electric Co., treasurer; and Michael Elgutter, secretary-manager.

Elected to the board of directors were John M. Nunez, Maritime Electric Co.; Conrad Appel, Sr., Sharp Electric; Fred Lindsey, Lindsey & Morgan; and B. A. Wilson, Gulf Electric, Inc. Harry Mentrup, Nola Electric, Inc., was named to the board of governors.

"Sure, I put in CHAMPION Fluorescents ...A good job deserves the best lamps"
CHAMPION FLUORESCENT LAMPS
CHAMPION FLUORESCENT LAMPS
CHAMPION Lamps
CHAMPION LAMP WORKS
Lynn, Massachusetts
A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO.

News about people

A series of executive promotions to further consolidation of staff marketing has been announced by **Robert C. Graves,** vice-president in charge of sales for **Federal Pacific Electric Co.**

Those promoted include **M. J. St. John** to manager, Distributor Products Department; **G. E. Benson** to manager, General Products Department; **J. T. Donahue** to product manager, Regional Plant Apparatus; **G. A. Dusch** to product manager, Switchgear Apparatus; and **C. A. Schmidt** to manager, Industrial Products Department.

M. J. St. John

C. A. Schmidt

C. G. Landeck who is in charge of switch and fusible equipment and **R. L. Sleesman,** recently appointed StABreaker product manager will report to Mr. St. John. Mr. Benson will coordinate sales involving two or more Federal Pacific manufacturing divisions. Mr. Donahue will head marketing of panelboards, switchboards, motor control centers and stage and theater boards. Mr. Dusch will direct sales of medium and high voltage switchgear.

C. A. Schmidt, as manager of the Industrial Products Department, now has product responsibility for individually enclosed DMB breakers, panelboard-switchboard components and motor controls. **John LaRoque** will serve Mr. Schmidt as product manager for motor controls.

Several new appointments have been announced by the **Potomac Edison Company** to be effective immediately.

Merle G. Kaetzel was named to the position of assistant to the company president. Mr. Kaetzel is a graduate of Washington and Lee University and joined the company in 1934.

Roger V. Mitchell, purchasing agent, has been appointed to the post of manager of purchasing and stores for the utility company. **Franklin D. Spofford** has been appointed assistant manager of purchasing and stores.

Charles D. Lyon, promotional manager since 1953, has been promoted to general commercial manager for the utility system. He will administer activities concerned with residential and commercial promotion, advertising, public relations, merchandising, servicing, metering, power sales and engineering and area development. He is a graduate of Yale University and has nearly thirty years of utility company experience.

John P. Coblentz was appointed manager of commercial marketing and **George O. Mullan** was appointed manager of residential and farm marketing. Mr. Coblentz joined the company in 1936 in the power sales and engineering department. Mr. Mullan has served in the farm service field since joining Potomac Edison in 1945.

W. Warren Woodruff, director of **TVA's** division of power engineering and construction with headquarters in Chattanooga, is retiring after nearly twenty-four years with TVA.

Mr. Woodruff joined the agency in 1933, the year it was created, and throughout the years has been in charge of the design and construction of TVA's transmission lines and substations. He was graduated from Cornell University in 1911 and has been associated with the electrical industry for forty-five years.

Victor R. Despard, vice-president of **Pass & Seymour, Inc.,** of Syracuse, N. Y., and leading electrical inventor, will be recognized by the National Electrical Manufacturers' Association in November for his 50 years of outstanding achievement in the industry.

Victor R. Despard

He joined Pass & Seymour sales organization in 1908, traveling extensively to observe first-hand and to assist materially the spread of the "miracle": electricity. He later resigned to go into the electrical manufacturing business for himself. He has since had interests in the Victor Machine Works, Despard-Gordon Co., McGill Manufacturing Co., Chicago Mica Co., and Fibroc Insulation Co.

During his career, Mr. Despard has made some notable contributions to the industry, having been granted more than 70 U. S. Letters Patents in the electrical field and also a number of foreign patents.

Houghton R. Hallock, who recently retired from the U. S. Army Corps of Engineers after twenty years service, has been elected executive vice-president of the **Texas Atomic Energy Research Foundation** it was announced by W. A. Parish, president of Houston Lighting & Power Co., who heads the foundation.

Mr. Hallock is director of research for Texas Electric Service Co., Fort Worth, and is on loan from the company for his duties in connection with the foundation.

H. R. Hallock

Mark N. Walters

New assignments for three employees associated with the Jacksonville branch of **Raybro Electric Supplies, Inc.,** have been announced.

Rufus F. Carpenter, formerly a territory salesman, has been appointed to a position of branch supply sales manager. **R. L. (Bob) Pike,** also a former territory salesman, has assumed the responsibility for industrial sales. **Mark N. Walters,** formerly associated with the company's headquarters Tampa branch as a territory salesman, has been named to the position of operations manager of the Jacksonville branch.

Lewis M. Smith has resigned as president of **Alabama Power Company** to become vice-chairman of the board of directors.

A graduate of the College of Engineering of the University of Alabama, Mr. Smith came to the company in 1923. He has been chief electrical engineer, director of public relations, and vice-president and general manager.

To succeed Mr. Smith as president, the board of directors elected **Walter Bouldin.** Mr. Bouldin, a native of Scottsboro, Alabama, holds an A. B. degree from the University of Alabama and an Ll. B. degree from Harvard.

E. C. Easter who was elected an executive vice-president, joined the company in 1927 as chief agricultural engineer. He is a graduate of Alabama Polytechnic Institute.

Malcolm Morrison has announced his retirement from the **Oklahoma Gas and Electric Company** and his position as vice-president in charge of municipal relations. Mr. Morrison retires after twenty-three years of service with OG&E.

Herbert L. Branan, assistant to the president, in addition to his present duties, will assume responsibility for municipal and other general matters formerly handled by Mr. Morrison.

Speedolets save dollars and hours on every installation! No threads or special clamps are needed. Slip into place, tighten set screws. They cost less than other type fittings — and save labor cost on installation.

Short on installation time, but long on durability! Speedolets are die cast of the same special aluminum alloy that has made Killark fittings famous for years. They'll last and last . . . because aluminum never rusts or corrodes.

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KILLARK SPEEDOLET FITTINGS

For Thin-Wall Conduit

"I'm sold on KILLARK'S new line of Speedolets . . . they make the fastest, neatest installations I've ever seen."

"Now I can go up the ladder with no more than a screwdriver in my hands. All I have to do is slip the fitting over the thinwall conduit, tighten a set screw — the job's finished! No wrench to use, no small parts to handle.

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THE LATEST ADDITIONS
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CLAMP-ON ENTRANCE CAPS

for both "E. M. T." & Heavy wall Conduit Sizes
¾"-1"-1 ¼"-
1 ½"-2"

"E. M. T." CONNECTORS

ALL SIZES
from
½"-2"

"E. M. T." COUPLINGS

ALL SIZES
from
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INSULATING BUSHINGS

ALL SIZES
from
½"-6"

SERVICE CABLE PLATES

For 2/3 SEU and SEA
For 1" "E. M. T."

Write For Catalog And Latest Price Sheets

ACF

ATLANTIC CONDUIT FITTINGS COMPANY
BOSTON, MASSACHUSETTS

Paul Cornelisen

The appointment of **Paul Cornelisen** as sales manager of **The Kirlin Company,** Detroit, Mich., has been announced by **Ivan M. Kirlin,** president. Mr. Cornelisen will handle the direction of internal and external sales policies. He is a graduate of the University of Illinois and was previously associated with Curtis Lighting Co.

R. L. Lock, vice-president in charge of engineering, at **Anderson Electric Corp.,** in Birmingham, Ala., has been elected an alumni member of the **Auburn Research Foundation** of Alabama Polytechnic Institute. Mr. Lock is one of eight alumni members of the Foundation.

The Auburn Foundation was created thirteen years ago to study the basic industrial research problems of all industry in Alabama, and in the United States. It has twenty advisory members and 102 active members engaged in study of research problems.

The Okonite Company has named **Ernest P. Clement** district manager of the Birmingham office, **Julian R. Hoss** district manager of the Atlanta office, and **Ernest C. Range** regional engineer for the electric wire and cable manufacturer's Southern region, stationed at Atlanta. These new appointees will report to Regional Sales Manager **Dewey A. White.**

Mr. Clement, who is a graduate of the Alabama Polytechnic Institute, has served in both the Birmingham and Houston sales offices.

Mr. Hoss has been a member of the Atlanta sales force for the past three years, prior to which he worked in New Orleans and Birmingham sales territories. He was graduated from Georgia Institute of Technology.

Mr. Range, formerly manager of the Atlanta office, has a service record of 23 years in Okonite's Southern region. Before this he had extensive engineering experience with the Tennessee Electric Power Company and the Commonwealth and Southern Company.

FOR EXIT LIGHTING

PRESCOLITE IS PREFERRED

HERE'S WHY...

"Dielux" Diecast Frames precision made for strength, lasting beauty.
Heavy, Welded Steel Housings, Cryscoat processed for proper paint bonding.
Die cut Metal Letter Stencils.
Unbreakable Fiberglas Lens Panels—6 color combinations.
Diecast Frame Inner Section with concealed hinge swings out for easy access to interior.

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Write for your copy of catalog on complete line of PRESCOLITE Lighting Fixtures.

PRESCOLITE MANUFACTURING CORP.
2229 4th St., Berkeley 10, Calif.
Easton Road, Neshaminy, Penna.

D. W. Hawkins

D. W. Hawkins recently joined the **Charles K. Ramond Co.,** manufacturers representatives of 1021 Carondelet Bldg., New Orleans, La. He will specialize in handling the Light & Power line of fluorescent fixtures.

The Ruby-Philite Corporation, of Long Island City, N. Y., manufacturers of fluorescent and incandescent lighting equipment, have appointed as their Oklahoma representative, **Charles E. Pruitsman,** 1708 East 13th Place, Tulsa. The **Ray Martin Company** with headquarters at 1224 Woodgate Drive, Kirkwood, Missouri will represent the company in the Arkansas, southern Illinois and east Missouri territory.

Frank C. Michael, 71, widely known electrical engineer specializing in marine electrification, passed away recently at his home in Gastonia, North Carolina.

Upon graduation from North Carolina State College in 1907 he began a career as an electrical engineer and contractor which was to span half a century. Mr. Michael established the firm of Michael & Bivens, later becoming **Mill & Marine Electric, Inc.,** in Gastonia nearly forty years ago.

George T. Brundrett, who has represented **Hubbard and Company** in Texas and the southwest for 28 years, has been transferred to the Plano, Texas, sales office.

Other territorial assignments in the Southwest Division include that of **Hal M. Layton, Jr.,** who will now cover southwest Louisiana and the Texas Gulf Coast, with headquarters at Houston.

B. J. Williams will cover portions of New Mexico, Texas, and Louisiana, with headquarters at Dallas.

J. A. Wills will cover Arkansas, Mississippi, and portions of Tennessee and Louisiana, with headquarters at Jackson, Miss.

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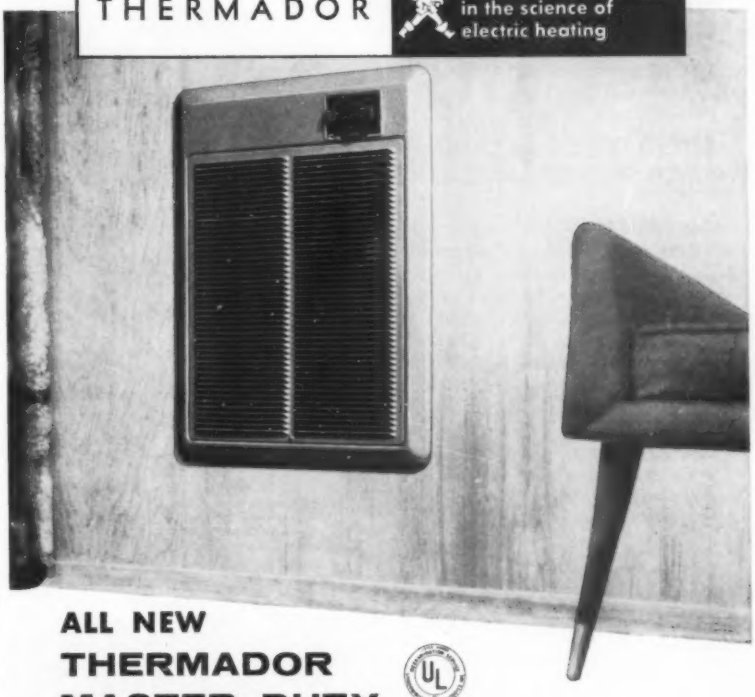

ALL NEW THERMADOR MASTER-DUTY BILT-IN FAN-TYPE ELECTRIC ROOM HEATER

Heats the "Living Zone"

"a heater in winter—a fan in summer"

- heat-speed efficiency greater than any other heater
- new ease of installation
- the ultimate in room-by-room thermostatic heat control
- new motor location in cold-air stream
- flush-to-wall installation projects less than 1 inch
- new type turbo-fan, quietest ever
- cleaner, safer, healthier—no soot —no flame—no fumes
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- heat discharged at floor level—circulates thru "Living Zone"
- new Spanish Gold baked enamel finish blends with room interiors

A THERMADOR HEATER FOR EVERY ROOM

Remember, when Thermador is specified, installation is easier, profits are bigger, and customer satisfaction is greater.

Model NW | Model RB | Model LR — **BILT-IN ROOM HEATERS**

Model PR | Model HF | Model MHF — **PORTABLE ROOM HEATERS**

The Originator of the Fan-Type Electric Heater

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ELECTRICAL MANUFACTURING COMPANY

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Ill., Ind., N. Ky., E. Mo. — Klaton Chapman, 11-104 Merchandise Mart, Chicago, Ill.

Kan., W. Mo., E. Neb., Okla. — W. H. Faber Co., P.O. Box 7043 C.C. Sta., Kansas City, Mo.

Ohio — Robert E. Williams, 19119 Wickfield Ave., Cleveland, Ohio

Ark. — C. A. Birmingham, 3546 Oakley Ave., Memphis, Tenn.

La., Tex. — W. E. Tallman, 2236 Sutter St., Dallas, Tex.

Md., Va., W. Va. — Warren J. Gottemeyer, Apt. E, 411 Hunting Towers, Alexandria, Va.

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Rifle Sight → ← Watertight Connector

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SPEED YOUR SERVICE ENTRANCE INSTALLATIONS

They're thrifty! M&W Kits contain every needed fitting for a quick, reliable wiring job. No lost time, no costly inventory. *They're fast!* Modern, time-saving slip-fittings are used throughout. With no thread-cutting, you reduce installation time to fractions. Complete range of sizes and fittings available to meet all local codes and conditions.

NEW CATALOG 57 gives full details, prices, installation data on Mast Kits, Electrical Fittings, Cable Racks, Wiring Specialties. Write for your copy today.

Complete-package Kits are furnished to your order and including fittings shown above.

M&W Electrical Fittings
The M. & W. ELECTRIC MFG. CO., Inc.
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Reach For Test-Proven

ACCURATE TAPE

FRICTION .... RUBBER .... PLASTIC

Test-proven by International Testing Laboratories, Inc., for bond and tensile strength, climatic extremes, dielectric qualities, and elongation tests. Accurate exceeded all ASTM requirements. Rely on Accurate with confidence—Accurate is the choice of electrical men everywhere. Accurate Plastic Tape is Underwriters' Laboratories approved.

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GARFIELD, NEW JERSEY

Technical books

Metallic rectifiers

"Selection and Application of Metallic Rectifiers," by Stuart P. Jackson. Published by McGraw-Hill Book Co., 327 W. 41st St., N. Y. 36, N. Y., 320 pages, illustrated, $8.00.

In line with the increasing use of metallic rectifiers, this newly-published book is planned to serve as a guide for engineers and technicians in the selection and application of these rectifiers. It gives information on their fundamentals, and characteristics, and their use in a wide variety of electronic and electrical equipment.

Fundamental rectifier circuits are covered, also such related circuitry as filter circuits and transformer requirements. A section deals with the general characteristics of metallic rectifier cells.

On this basis the book then discusses the combination of the rectifier circuits and the cell characteristics to show design procedures for such uses as pulse circuits, electroplating power supplies, industrial power supplies, battery charging, and amplistats. Illustrative examples are included.

The general discussion of metallic rectifiers includes information on ratings, rating methods, and how to use typical data provided by manufacturers. The book includes a considerable amount of design data in the form of curves and equations.

Pure and applied math

"Elements of Pure and Applied Mathematics," by Harry Lass. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y., 491 pages, $7.50.

Containing a more rigorous treatment of individual topics than is found in the majority of applied mathematics texts, this work is a valuable reference book for all readers and an excellent text for upper-division undergraduate courses for physical science, engineering, and math majors.

The book provides a thorough treatment of the various subjects in classical mathematics which are most useful to the engineer and physicist. It covers and illuminates most of the subjects that an undergraduate math major will encounter in his course work, and gives him an exceptionally good preparation for the use of applied mathematics.

Free bulletins

A new 52-page 8½ x 11 illustrated 2-color catalog (Bulletin 8314) de-

Pyramid Instrument Corp., Lyn-

There is a short treatment of nonlinear mechanics and game theory, and a chapter on group theory and algebraic equations. The treatment of vector and tensor analysis, along with probability theory and statistics, is unusually complete. The handling of orthogonal polynomials is unique in such a book.

The material has been so written that each chapter is independent of the others although many cross references tend to unify the subjects at hand. A considerable number of examples are worked out in detail, and problems follow each section. Extensive bibliographies follow each chapter.

Heat pump sink

"The Design of a Heat Pump Buried Coil," by Donald M. Vestal, Jr., and Billie J. Fluker. Published by the Texas Engineering Experiment Station, College Station, Texas, 33 pages, illustrated, $2.00.

The publication describes a basic equation and how it is used to obtain the appropriate length and configuration of the heat pump buried installation employing the earth as a heat pump and sink.

The equation and all the other data contained in the publication result from about ten years intensive research which involved continuous observation of three buried coils of different diameter, soil temperature recordings, and soil moisture and soil conductivity studies.

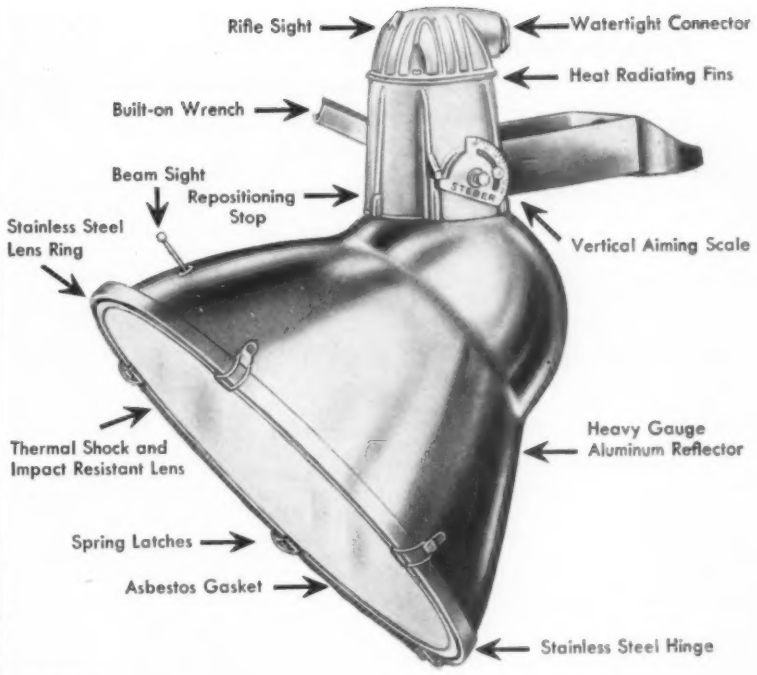
Audio amplifier

"Audio Amplifier Service Manual, Volume Nine." Published by Howard W. Sams & Co., 2201 East 46th St., Indianapolis, Ind., 240 pages, $3.95.

This very popular series presents complete photo coverage, standard notation schematic, parts list, voltage and resistance measurements, and servicing information for each piece of equipment.

Volume Nine contains complete data on fifteen amplifiers, three preamplifiers, twelve tuners, and five custom radios. All of this equipment was produced during 1956.

Besides being invaluable to the technician who services audio equipment, the technical data presented in the Sams Audio Amplifier Service Manual is of extreme interest to the Hi-Fi enthusiast, experimenter, and hobbyist who desires complete information on audio equipment.



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You can pay more, but you can't buy better floodlights!

Steber floodlights meet any and all job requirements! They provide efficient, economical high intensity illumination for sports areas of all kinds, parking lots, protective and working light for industrial plants, railroad yards and construction jobs.

Steber floodlights are easier to install, easier to wire, easier to aim. Exclusive ANODAL processing gives the heavy gauge aluminum reflector a smooth, glass-hard, ageless finish inside and out. You get higher efficiency, easier maintenance, better looking installations.

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Free bulletins

A new sixteen-page bulletin, **"Distribution Transformers** for Rural and Industrial Substations" (75 through 500 kva, 67 kv and below, single phase), has been released by **Allis-Chalmers Manufacturing Co.,** 938 South 70th St., Milwaukee 1, Wis.

The bulletin describes the materials and various production steps used in producing this type of transformer. It includes a complete summary of weights and dimensions along with outline drawings, and EEI-NEMA standard accessories for the various sizes.

For copy of bulletin, ask for item B-1046, using the coupon on page 106.

A **stepdown transformer catalog,** listing stock sizes with specifications and dimensions has been issued by **Acme Electric Corporation** of Cuba, N. Y. These stepdown transformers are an economical way of providing 115 volt service when only 230 volt power circuits are available.

For additional data, ask for item B-1059, using the coupon on page 106.

A new 52-page 8½ x 11 illustrated 2-color catalog (Bulletin 8314) describing the American Blower line of **Sirocco utility sets** is now available from **American Blower Division** of American-Standard, Detroit 32, Michigan.

The new catalog illustrates and thoroughly describes the various size ranges and configurations of fan wheels and motors available. Features and advantages of the Sirocco units are explained and illustrated.

For copy of bulletin, ask for item B-1047, using the coupon on page 106.

Dramatic new **ideas and applications of lighting** are graphically presented in a portfolio of decorative lighting fixtures just released by **Lightolier, Inc.,** 346 Claremont Ave., Jersey City, N. J.

The 32-page Portfolio presents new shapes and profiles which combine good design with scientific lighting principles. Unusual treatment of both new and old materials are included. In step with the return to elegance trend in decoration are Lightolier's five new Crystal silhouettes which express in vivid strokes the grand chandelier feeling, but without the clutter of non-essential detail.

For additional data, ask for item B-1060, using the coupon on page 106.

Pyramid Instrument Corp., Lynbrook, N. Y., has published a service bulletin which gives full engineering specifications on its **Remcon low-voltage relay** with its own built-in transformer. This silent, modern relay is of special interest to manufacturers of original equipment.

For copy of bulletin, ask for item B-1048, using the coupon on page 106.

A six-panel folder for the use of electrical suppliers in acquainting their electrical contractor customers with its line of **masonry anchoring and drilling devices** has been issued by **Arro Expansion Bolt Company** of Marion, Ohio.

The company's line of machine screw expansion anchors, stud bolt anchors, two-wing spring-type toggle bolts, lead screw anchors, spiral drive nail anchors and expander hammerless setting tools are featured, along with a complete line of masonry drills, including two which are carbide tipped.

For copy of bulletin, ask for item B-1049, using the coupon on page 106.

A recently issued twelve-page bulletin of the **General Electric Co.,** Schenectady 5, N. Y., shows how **RM** (repetitive manufacture) **standard-design transformers** can be applied where a special unit seems to be required. The publication explains what is meant by an RM medium transformer, tells why emphasis is being placed on RM's and what is gained by using them, and lists eight application areas for RM units. It also shows how economies can be effected by applying RM transformers on systems with non-standard voltages in parallel with units having non-standard impedance, and how to satisfy non-standard top requirements.

For copy of bulletin, ask for item B-1050, using the coupon on page 106.

A colorful folder describes four new **fluorescent fixtures** being manufactured by **Smithcraft Lighting,** Chelsea 50, Mass.

Lighting characteristics, mounting, maintenance, accessories photometric data and specifications are included for the Twosome unit which features 45° x 45° compound shielding in a shallow unit with no dark center streak; the Executive, a very wide, all-steel louvered unit with self-illuminated sides; the Smithcraft Civic, an extruded aluminum-framed luminaire to complement the beauty of any interior; and the Smithcraft Freeway, a plastic-enclosed unit, ideal for corridor-lighting and other long, narrow traffic areas.

For copy of bulletin, ask for item B-1051, using the coupon on page 106.

Specify
KNOX
WIRING DEVICES
Increased Sales and Profits
• FOR DOLLAR VALUE
• FOR SERVICE
• FOR QUALITY
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660 Watts
250 Volts
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COMBINATION PORCELAIN KEYLESS LAMPHOLDER
For use with either 3¼" or 4" Outlet Boxes
You'll find every KNOX product is made of fine quality materials... plus precision engineering and 33 years of manufacturing skill and "know-how"... a combination that assures you of a fine product, durable, safe and easily installed. For best results, specify KNOX.
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New products

Circuit breaker loadcenters with three-phase power

A WIDE RANGE of low cost QO circuit breaker loadcenters for residential and light commercial work having three-phase power has been announced by Square D Co., 6060 Rivard St., Detroit 11, Mich.

These new devices, utilizing the new low cost three-pole QO circuit breaker, reduce previous costs by 50 per cent.

Loadcenters having main lugs are now available from 12 through 42 circuits. Three-phase main breakers are listed in 12 and 20 circuit combinations. Two types of service entrance devices make use of the split main bus idea to comply with paragraph 2351 of the National Electrical Code. This eliminates the need for a central main disconnect.

One device provides one or two three-pole branch circuits in combination with 4 or 5 double-poles. One of these doubles feeds up to 14 single-poles for lights and receptacle circuits. The second device has a separate and sealable section for the three-phase circuit. The usual single phase section contains up to 4 double-poles and 10 single-poles for lights and receptacle loads.

For additional data, ask for item P-1052, using the coupon on page 106.

Direct-drive centrifugal 1/10 to 10 hp roof ventilator

A PFMA-RATED direct drive centrifugal roof ventilator, similar in all respects to their belt drive centrifugal roof ventilator, is now being marketed by Peerless Electric Co., 1401 W. Market St., Warren, Ohio.

The new unit has various motor selections, including single phase, 115/230 volt, 60 cycle; three phase,

FRANKLY, IT HAS BEEN IMPOSSIBLE TO IMPROVE THE EXCELLENT CONTACTS OF EAGLE RECEPTACLES WHICH HAVE BEEN PROVEN FOR OVER 25 YEARS.

But Now...

EAGLE Presents Them With The

NEW LOOK

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No Grooves To Catch Dust!

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AND

* 7/8" LONG MOUNTING SCREWS attached to strap

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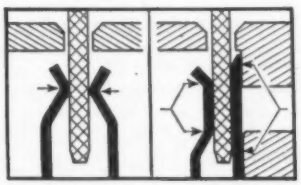
Now Also Available with

EAGLE **HEAVY DUTY DOUBLE-WIPE CONTACTS**



Ordinary Contacts — Eagle Contacts

Ordinary double-wipe contacts make contact at only 2 places. Eagle Exclusive double-wipe contacts incorporate the Eagle pressure principle to assure maximum contact area with the prong. Note large areas of contact between prong and flat surfaces of double-wipe contacts, backed up by plastic at top and bottom.

SINGLE CONTACT DUPLEX RECEPTACLES
No. 733 without plaster ears
No. 736 with plaster ears
DOUBLE-WIPE DUPLEX RECEPTACLES
No. 977 without plaster ears
No. 978 with plaster ears

All available in Brown or Ivory
Note—No. 978 Also meets Fed. Spec. WR 151A

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Leo Arnstein, 23-10 Bridge Plaza South, L. I. C., N. Y.

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"BUFFALO" SKY-VENT® POWER ROOF VENTILATORS

Yes, complete units with motor, fan, housing, weather hood, dampers and integrally welded roof curbing—ready to install! "Buffalo" Sky-Vents® are ideal for your roof exhaust jobs in the wide capacity range from 1000 to 250,000 cfm. Available in Style "H" (illustrated) or cylindrical vertical discharge Style "V", both of typical heavy-duty "Buffalo" construction with efficient "Buffalo" Propeller or Axial Flow Fan. Write for Bulletin FM-2345 and prices on these popular new fans.

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This new, entirely different estimating guide has 175 completely worked out charts.

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This book is easy to use—it has no complicated mathematics or formulas to work over. You merely determine the nature of the wiring, check it in the BLUE BOOK OF ELECTRICAL ESTIMATING and there's your answer—it's the simplest estimating book ever written.

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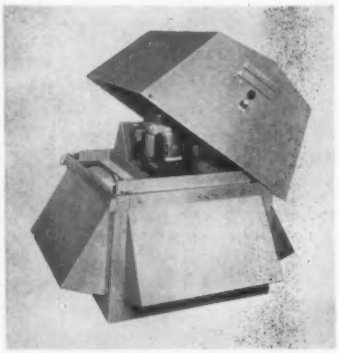
☐ Send C.O.D. I'll pay postman $7.75 plus C.O.D. fee on delivery.

(October 1957)



220/440 volt, 60 cycle; and specially designed motors, including totally enclosed and explosion-proof power units. Horsepower sizes are from 1/10 hp to 10 hp.

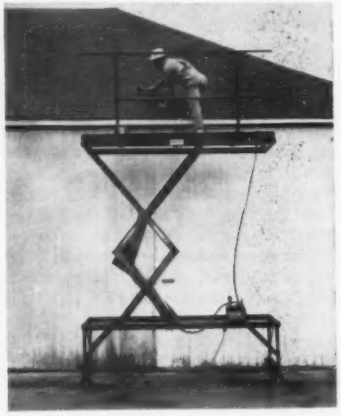
Wheel diameters of direct drive centrifugal roof ventilators range from 12¼ inches to 36½ inches. Capacities are from 1,100 cfm to 25,000 cfm.

The backward curve wheels are dynamically balanced. They are taper-locked to the shaft. The true spun venturi inlet assures quietness and high efficiency and helps the unit operate with near centrifugal blower characteristics. Peerless direct drive centrifugal roof ventilators are weathertight and a bird screen is standard equipment.

For additional data, ask for item P-1053, using the coupon on page 106.

Portable hydraulic scaffold lifts 800 pounds to 10 feet

A PORTABLE HYDRAULIC scaffold for electricians, industrial maintenance, building contractors, masonry contractors, painters and interior decorators is being manufactured by Grell Enterprises and marketed by the Adam Co., P. O. Box 628, of Perry, Oklahoma.



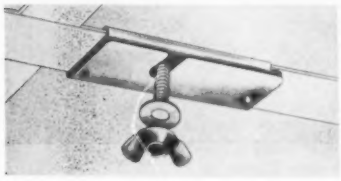
The Jim Dandy, Jr., weighs only 860 pounds and is easily portable in a pickup truck. It has a lifting capacity of 800 pounds and elevates the 2½' x 8' working platform, fully

loaded, to a height of 10'. Elevation and lowering of the platform is done by a hydraulic pump powered by a ⅓ hp electric motor controlled from the scaffold platform. The unit is mounted on casters for easy moveability on the job.

For additional data, ask for item P-1054, using the coupon on page 106.

Grid fixture hanger mounts without tools

THE SNAPEE grid fixture hanger recently introduced by Daniel Woodhead Co., of Chicago, Ill., mounts any fixture—box, cabinet or curtain wall to T bar grid without the use of any tool.



No holes, bolts or screws needed, Snapee No. 210 hanger slides onto "T" bar, snaps into locked position and wing nut mounts fixture securely in any desired position. Each hanger supports up to 300 lbs. It takes only one man to do most fixture hanging jobs.

For additional data, ask for item P-1055, using the coupon on page 106.

Guiding device for wires, cables and conductors

RECENTLY INTRODUCED by the Industrial Electric Co., 311 N. Broadway, Knoxville 17, Tenn., is a device for

guiding and installing wires, cables, and insulated conductors within conduit systems having outlet boxes.

Temporarily held in operating position by duel Alnico magnets the wires pass over a brass roller eliminating binding, skinning, or marring of the insulation, which frequently occurs when the wires are allowed to pass over sharp corners without the use of these devices.

For additional data, ask for item P-1056, using the coupon on page 106.

New No. 5442 Ultra-Lite. Four mercury luminaires are tilted 15° for improved high level, uniform light distribution. Lamps and Alzak aluminum reflectors are housed under modern parabolic dome of spun aluminum.

Revere Ultra-Lites

The newest approach to large area mercury lighting

Wide Area Coverage — Ultra-Lites are designed for illuminating large outdoor areas. Parking lots, shopping center plazas, playgrounds, parks . . . wherever wide horizontal coverage is needed, Ultra-Lites qualify as an efficient and economical lighting answer.

More Uniform Lighting — Ultra-Lite mercury luminaries are engineered to produce a square light pattern which provides greatest light uniformity. Patterns overlap, eliminating "dark spots."

Ultra-Lites Set a New Pace in Styling — Whether used in an original installation or as replacement for obsolete lighting equipment, Ultra-Lite's modern, dramatic appearance adds a striking atmosphere to any area.

Pole Requirements Reduced 50% to 75% — Wide coverage of Ultra-Lites require fewer poles per installation. Result: lower installation costs, less installation time. Maintenance time is reduced.

For further information on Revere's Ultra-Lites and their applications in outdoor lighting, write for Bulletin 400-13.

Revere ELECTRIC MFG. CO.®

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Available in Canada thru Curtis Lighting, Ltd., Leaside, Toronto, Ontario

OUTDOOR LIGHTING: Industrial • Commercial • Service Stations • Streets • Sports • Airports • Shopping Centers

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PLUS VALUES
for YOU
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of Hanging
and Fastening
Devices:

ONE SOURCE.
Saves you time, inventory and freight costs.

TOP QUALITY
and job-right design make satisfied users.

GOOD PACKAGING
— Strong, colorful cartons, clearly labelled.

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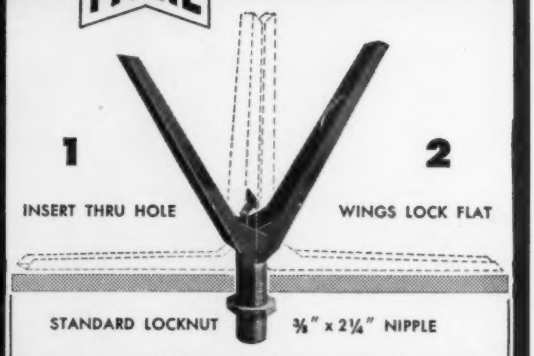
stimulated with attention-getting ads like this ➔

Hang Fixtures Faster and Easier
with the PAINE Outlet Box and FIXTURE HANGER



One of the easiest to install and most serviceable hangers ever designed. Solves the problem of hanging fixtures and outlet boxes to ceiling or wall surfaces where you can't reach the other side. Simply insert thru hole — as small as 1⅛" in diameter — and wings drop flat, locked in place by a patented key. To release wings for removing hanger at any time, just raise key with screw driver inserted thru nipple. Try these hangers once and you'll use them again and again.

Write for Catalog of Paine's complete line.

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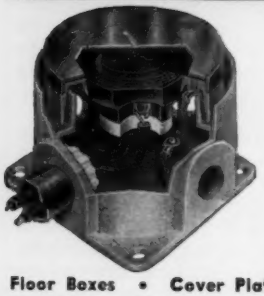
THE PAINE COMPANY, 21 Westgate Road, Addison, Illinois

Latrobe PRODUCTS
FLOOR BOXES • WIRING SPECIALTIES



SERVE LONG AND WELL

"Latrobe" Floor Boxes and Wiring Specialties offer real economy in installation and replacement costs.

Their unique design, free of unnecessary parts, means quicker installation and longer service.

Floor Boxes • Cover Plates • Pipe or Conduit Hangers • Gang Boxes • Nozzles • Fish Wire • Cable Supports • Junction Boxes • Insulator Supports • Staples and Cable Clips

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FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA

Dual spring door covers on new outlet plates

PIONEER manufacturer of electrical wiring devices, Pass & Seymour, Inc., Solvay Station, Syracuse, N. Y., has just introduced its new completely watertight, rustproof, weatherproof 4500 spring door cover.

The new units are ideal for industrial plants, garages, creameries, distilleries, breweries, loading platforms,

residences—anywhere that protection against the elements is important.

The 4500 unit features two hinged covers. When one half of the outlet is in use, the other half is closed securely. The covers snap shut automatically when caps are removed.

For additional data, ask for item P-1057, using the coupon on page 106.

Ten-contact relay is panel space-saver

ANNOUNCEMENT has been made of an addition to its line of Class 8501 Type D, 10-ampere relays by the Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.

Previously available in two sizes, 4 and 6 contacts, the Type D Relay is now available in a 10 contact size, with a maximum of 6 normally-open and 4 normally-closed or 8 normally-open and 2 normally-closed contacts.

This new relay measures only 5 inches high by 3 inches wide, a substantial space-saver where panel space is at a premium. All three sizes of the D relay have identical mounting hole dimensions for ease of electrical panel planning and interchange-ability.

For additional data, ask for item P-1058, using the coupon on page 106.

Engineering meeting

(Continued from page 58)

cussing trends in substation and feeder capacities and the availability of feeder ties, he emphasized the importance of these lateral ties, especially from an operating standpoint, and recommended that they be provided whenever the opportunity permits.

"The use of automatic throw-over switches," he said, "will probably become more common with the increase in dependency on the

reliability of electric power. These devices could supplement the conventional disconnect switches in providing feeder ties, although they are now used principally to transfer individual loads. In some cases, the operation of feeder tie switches by supervisory control may be justified.

"In order to provide reliable feeder ties, the increased substation capacity and larger feeder conductors must be backed up by increased attention to the improvement of conductor connections. The higher feeder loading and provision for transfer of large blocks of load by feeder ties will subject conductor connections to increased duty and connections which were once satisfactory may develop serious trouble from excessive heating."

The conclusions reached in his study of 15 kv feeder design of the future included the following:

"Larger substations and the increased use of triple rated substation transformers will help to provide reserve transformer capacity for feeder ties.

"In cases where triple rated transformers are not available, conventional transformers may be overloaded within certain limits in an emergency to permit feeder ties with little sacrifice in expected life.

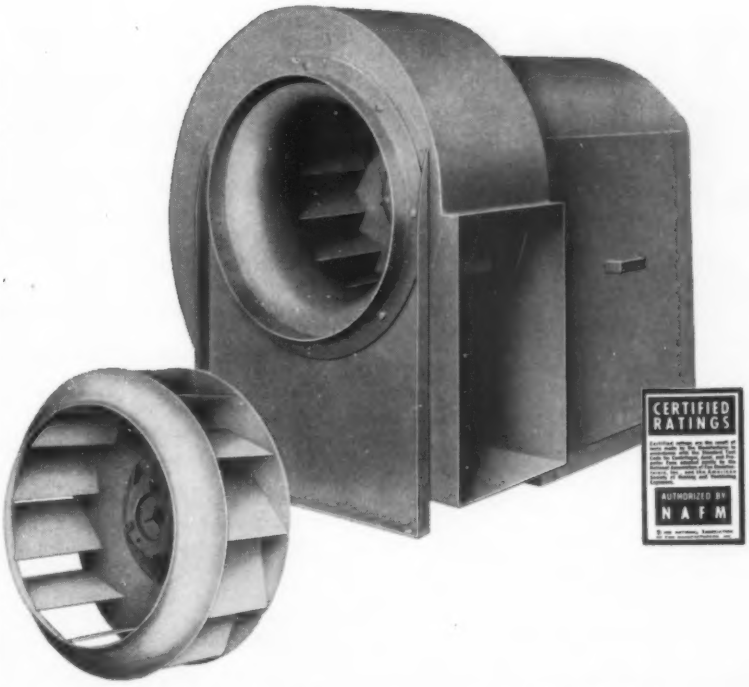
"Increased interest is being shown in feeders having both normal and emergency ratings. This practice will help provide feeder capacity for ties.

"Low voltage as a result of emergency feeder ties should seldom be a problem, except on long lightly loaded lines, and there the problem is not insurmountable.

"Feeder ties should be planned. This is especially important in light density areas, and in areas having an unusual geographical configuration. Ties are an important element of feeder design and will serve an increasingly important function in the future.

"If consideration is given to these factors in the planning of new substations and feeders, it can be said that no problems are foreseen with feeder ties of the future."

The Distribution Committee meeting also included the following talks: "Factors affecting choice of primary feeder voltages," by D. N. Reps, Westinghouse Electric Corp., Pittsburgh; "Relative overall economy of using large transformers and secondaries versus



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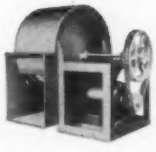
Completely Designed, Engineered and Manufactured by Peerless Electric

Peerless Backward Curve Blowers are all Peerless—motor and all. We control the entire production of this versatile blower, from drawing board to finished product. We guarantee it unconditionally for quiet, trouble-free operation.

Peerless Backward Curve Blowers can be specified with confidence. They are thoroughly tested according to test codes. They meet NAFM and NEMA standards. Scores of them are operating in schools, churches, hospitals and government installations.



FORWARD CURVE BLOWERS

Made entirely by Peerless; arc-welded housings and frames; wheels designed for quieter operation; dynamically balanced.

CENTRIFUGAL ROOF VENTILATORS

Matching wheel cone accurately fits spun venturi for quieter, smoother air movement. All welded construction; material 16 ga. or over. Each unit air tested, and rated to assure certified PFMA ratings. Fits standard curbs.

Write for Bulletins SDA-220, SDA-200, SDA-160

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TITAN
Completely Automatic, Portable
HI-WATT HEATERS
for faster sales, bigger profits !
featuring:

- HI-HEAT
- HI-QUALITY and
- HI-STYLE
- LOW, LOW PRICE

Plus NATIONAL ADVERTISING that pre-sells your customers !

The ONLY high-wattage heaters with
UNCONDITIONAL 10-YEAR GUARANTEE
of heating elements

- automatic thermostat
- automatic temp-limit control
- automatic safety shut-off

and many other deluxe features
3000 watt, 4000 watt & 4600 watt models

introducing
a totally new appliance
TITAN HI-V CONVERTIBLE
HEATS in Winter
COOLS in Summer

STOCK . . . FEATURE . . . SELL the nationally advertised TITAN LINE!

Write for full details on TITAN Hi-Watt Heaters, Titan Hi-V Convertible and the rest of the fast-selling Titan line of thermostatically controlled convection and radiant-convection heaters.

TITAN SALES CORP.
BUFFALO 10, N. Y.

smaller transformers and secondaries to serve residential loads," by W. L. Rush, distribution and transmission engineer, Louisiana Power and Light Co., New Orleans; and "Use of self protective transformer to eliminate cut-outs and lightning arresters in salt spray areas," by A. W. Baird, operating supervisor, Gulf States Utilities Co., Beaumont, Texas.

Separate meetings were also held by the Transmission and Large Substation Committee and the Power Production Committee.

Know the law

(Continued from page 86)

let a slack electric cord lie on the floor across the entrance to a public office during business hours, with no warning, either printed or oral. We think it clearly not negligent for a visitor to fail to discover and avoid this extraordinary hazard."

Conceivably, the injured visitor could collect damages against the electrical contractor and the owner jointly, with a right by the owner to be reimbursed by the contractor, if the active cause of the accident was negligence of the contractor or his employee.

High frequency

(Continued from page 29)

is small and because it is basically a constant current device all the lamps must be either on or off. The cost of conversion is several times that of the motor generator so the M-G set has been used for larger installations despite the probable higher maintenance.

Type B

The second system is the type first used in the Union College Field House previously described using a 400 cycle, 600 volt distribution and the split phase ballast circuit. (Figures 1-B and 2). Lamp efficiency increase is considerably less than type A since this is a sine wave generator and lamp cathode ionization is not maintained. With the losses in the high frequency choke coil, over-all efficiency is about the same as with 60 cycles for standard lamp currents.

Type C

Type C is the system which is being used in the Federal Reserve Bank. (Figures 1-C and 2) The frequency is 840 cycles which increases the lamp efficiency slightly and reduces the capacitor and coil size. With a distorted wave shape, lamp efficiencies have increased as high as 13 per cent at standard lamp currents with this type of equipment. Most of the auxiliary power losses are removed from the occupied area which makes possible the maximum reduction in air conditioning which is particularly important in the warmer climates. An estimated $10,000 is being saved in air conditioning, initially, in Houston. Since this auxiliary heat loss need not be constantly pumped out, a saving in operation is also anticipated.

Type D

This is a completely new type of system which has just been developed. It differs from its predecessors both in lamp circuit and method of frequency conversion. This system is designed to use any fluorescent lamp and is not restricted only to the instant starting lamps. The standard, high output, and very high output rapid start

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lamps may be used to good advantage. This circuit takes advantage of the series capacitor and still has a power factor of 90 per cent eliminating the auxiliary power factor correction coils required in Type C.

The voltage of this system may be either 120/208 or 277/480 three phase. (Figure 3) Standard single pole switches and circuit breakers can be used and the wiring reverts to common practice and standard components. The only difference in installation is that the power source is a voltage and frequency changer rather than voltage only.

The frequency change is a static multiplier but of a new and completely different type than Type A. The construction is essentially that of a transformer. The coils and laminated steel core are stationary; the only thing that rotates is the invisible magnetic field. The efficiency is as good or better than the motor generator and maintenance is greatly reduced if not almost completely eliminated.

The combination of these two developments provides a reliable, efficient lighting system and one which is not dissimilar to our present 60 cycle systems in outward appearance and installation.

Wave form is easily distorted with this type of multiplier to give maximum lamp efficiency. Since the high loss reactors have been eliminated from the circuit and the efficiency of frequency conversion is high, the over-all efficiency is more than the previous systems described.

Table II is included to show in greater detail the general characteristics of Types B, C, and D. There is no hard and fast dividing line between one or the other. Techniques used in one at the present time are very likely to be used in another in the future. This table is included to show what has been and can be done.

The increase in lamp efficiency between sine wave 350 and 1000 cycles is only 3 or 4 per cent, about the same as between 60 and 350. The best lamp efficiency is reached at about 10,000 cycles sine wave. However this frequency is not practical to distribute. Much above 1000 cycles will cause noticeable line losses. The effect of 10,000 cycles, sine wave, can be obtained by providing a square current wave of a lower frequency; cathode ionization is maintained and power losses at the lamp cathodes are reduced to a minimum.

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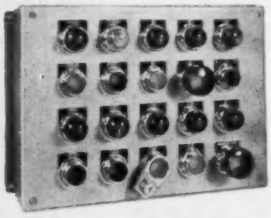

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capacitors and coils are reduced in size and cost as frequency increases. Lamp efficiency and lamp life increase slightly. Beyond one or two thousand cycles, losses within the frequency changers increase to a point where more costly materials must be used to keep efficiency up. Switching and line losses become noticeable. It would seem that the optimum lighting frequency range is less than 2,000 cycles and more than 350.

Summary

Fluorescent lamps produce more light and last longer when operated at frequencies considerably above 60 cycles. About 40 test installations coupled with recent new developments indicate a better performing lighting system may be installed using high frequency for an initial cost of the same or slightly less than the conventional lighting systems. The cost of operation has been reduced up to 25 per cent in some installations.

It seems likely that this new lighting system will find many uses in commercial and industrial areas as well as specialized applications such as radio and television studios or mercury vapor and fluorescent street lighting.

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Dallas Library

(Continued from page 25)

The main switchboard is adjacent to the transformer vault in the basement, and in the machine room. Heavy feeders to motors are very short, minimizing voltage drop problems. The distribution is basically a conduit and wire system radiating from the main switchboard to various lighting panels and distribution panels.

The connected load is approximately 1100 kva with a 780 kva demand in the summer and 480 kva demand in the winter. The largest motor is the air conditioning compressor motor, which is 350 horsepower. This is a wound rotor motor with the resistor grids being ventilated by an exhaust fan. This type of motor was used to provide low starting current, and to give capacity reduction to the air conditioning system. In addition to the compressor there are a number of chilled water pumps, air handling units, exhaust fans, condensate pumps, and small motors.

The general contractor was Robert E. McKee, and the electrical contractor, the Southern States Electric Company.

Relighting

(Continued from page 33)

candescent dome chandeliers augmented with inverted fluorescent coves along the walls and between the dining sections. The foyer is lighted with a plastic louverall ceiling for brightness.

Newer cafeterias have especially utilized lighting as a means of attracting the customer, and the Driftwood Cafeterias #1 and #2, also in St. Petersburg, are expected to receive national attention in the lighting field. A combination of fluorescent coves with incandescent chandeliers, suspended bullets, and recessed downlights, achieves both beauty and utility.

The newly-opened Circus in Clearwater is lighted by a partial luminous ceiling along entranceways, and an all-luminous ceiling over the serving area, with incandescent downlighting and fluorescent coves in the dining areas.

All described installations were planned by Florida Power Co. Commercial Department engineers with cooperation from owners, architects, and contractors on the various jobs. Good lighting is a contributing factor to the lines of diners awaiting admittance at every mealtime.

Windows of future

(Continued from page 46)

that is treated to conduct electricity. When power is applied, the panel lights.

Because the efficiency of electroluminescent lighting is not yet up to most present day light sources

widespread use is not yet economically feasible. What makes electroluminescent lighting so promising as a light source are the high efficiencies that may be possible. This efficiency limit is as high or higher than that of today's fluorescent lamp.

By freeing light from the confines of point or line sources such as incandescent or fluorescent lamps, electroluminescent lighting promises to spark totally new concepts of lighting. Light in the future will be part of the construction of walls and ceilings. And because electroluminescence is not restricted to flat planes, light may go into the construction of domes, balustrades, and other architectural designs.

Integrated lighting

(Continued from page 40)

reverberant.

Longitudinal members of the grid contain all electrical wiring and circuiting necessary to operate the lamps. The lower surfaces of these longitudinal members incorporate a grooved recess, the structure of which is movable vertically within the member to facilitate the insertion and supporting of movable partitions.

Integrated Lighting is for use in contemporary large interiors, in many types of buildings. The spaciousness and loftiness of the system, plus simplicity of area and line, make this an ideal lighting tool to create a structural pattern of interest which enhances interior environments.

Electric circus

(Continued from page 30)

deluxe cool lamps. This is supplemented by alternate pink and blue-white 150-watt R-40 lamps. Again each color is on a separate dimmer. The illumination on the stage can be adjusted up to 200 footcandles. The total lighting load is 9.2 kw.

A 3 kw package heat pump unit is mounted in the rear wall of the trailer to provide heating or cooling for a perfect climate inside the trailer. Cooking odors are exhausted through the front wall by two 700 cfm fans mounted above the louvered ceiling of the stage.

Ninety-two kilowatts of heavy-duty cooking equipment are connected for use on the stage including: two 6-kw ovens, a 7-kw

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steak broiler, one 6-kw broiler, a 22-kw range, a 12-kw steamer, a 12-kw griddle, a coffee-urn, two fryers, and a food freshener. Counter-line equipment is also on display.

Live demonstrations are conducted three times daily by company specialists for groups of food service operators and businessmen. Special sessions on lighting and electric cooking are held for school boards in each town. The circus trailer is providing an opportunity for commercial customers in small towns to see the latest types of electrical aids to business.

Footcandle values

(Continued from page 23)

better in stores and offices apply to more and more industrial operations. There, too, management accepts the principle that the most efficient use of interiors depends very largely on how people see, and therefore, how they feel in their reactions to superior seeing conditions. The controlled conditions plant is representative of the attitude. Where the product requires the whole plant to be operated at precise temperatures with good ventilation, the effect on personnel has been good, too.

The necessity for higher level lighting in such a plant is, of course, closely related to the seeing tasks that are implicit in all the control objectives. People are capable of better performance in any plant, controlled conditions or not, with better tools, among which well designed lighting is of prime importance. Since the eyes direct the work of the hands, it is almost universally true that lighting correlated to the difficulty of the tasks will influence superior performance.

A new area of enterprise like the aircraft industry, accustomed to applying bold new methods, does not hesitate to use high level lighting as a fundamental industrial tool. Thus, we find one company solving an assembly line problem involving complex electronic equipment, by providing their skilled asemblers with a comfortable 450 footcandles on the work. At this level hand and eye coordination can proceed at a pace commensurate with the care the work requires. Manufacturers in other lines, with analogous problems, seek the same technique for their work in similarly air conditioned plants.

The automobiles we drive today are equipped with engines developing 200 to more than 300 horsepower. We do not need all this power to get around faster. Its value lies in the flexibility it provides. Smooth, effortless response at all speeds is what we want. Reserve power is what we count on for greater maneuverability in traffic. Progress for the motorist goes far beyond the bare essentials of good transportation. We are a motor-minded people, very particular about the pleasure we get in the use of our cars.

There was a time when horsepower for motor cars and footcandles recommended for general interior lighting took about the same number. Engineers with whom I have been associated with at Nela Park for most of the last thirty years have long known that most people choose 200 to 300 footcandles in individual tests available at our GE Lighting Institute. They chose these levels being free to choose as much light as they wanted. Those who knew about the usual levels in actual use were always curious to know why their free choice was so much higher. The probable explanation is that our preferences were formed in the eons of time when the human race spent its waking hours outdoors with levels up to 10,000 footcandles.

Outdoor levels ideal

Outdoor levels influenced the earliest standards of the Illuminating Engineering Society. The ideal the founding members sought is that which is found in the shade of a tree. There we find 500 to 1000 footcandles. In 1906 the ideal seemed remote for duplication with then available electric lamps. Up to the late thirties the best we could do towards approximating the ideal with filament lamps was about 40 footcandles.

Then, in 1938, following the development of fluorescent lamps, it became possible to design comfortable installations at progressively higher levels. This is not to say that filament lamps have been displaced. Still the most widely used source, they take their place in the most advanced installations as a valuable accompaniment to the esthetic goals of higher level, comfortable lighting.

We have not equalled the upper limit of the IES ideal today, except in special cases where supplementary lighting is required. The ideal, however, as the accompany-

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ing data indicates, is not remote or inaccessible as it seemed through most of the years of developing illumination practice. We are making headway in providing for the public the kind of performance factors offered in the smooth, effortless operation of fine motorcars.

Footcandles, let it be remembered are going up . . . but not in price. The vision to choose better lighting for the manifold advantages it gives to so many human activities, personal or business, has the advantage of economy on its side.

Technology is advancing so rapidly today, almost all activities in the work world must quicken its reaction time . . . but comfortably. As we approximate the ideal of the lighting condition we find under the shade of a tree on a summer day we shall make work more effective because we enjoy more pleasant conditions for its performance. More production, of course, leads, we hope, to a fuller life in every dimension. Skill with lighting at work or in recreation will be a key factor in better living.

Economic Comment

(Continued from page 4)

investor is to realize that investment means just that—and not speculation. Securities, during the early stages at least, should be sound purchases of high quality and should be held until their purpose is fulfilled without consideration of the temporary vagaries of market price.

Population trends

Recent estimates of the United States Bureau of the Census predict continued growth for the South, although in comparison certain other sections of the nation are growing more rapidly. The South, in 1970, should have a population in the neighborhood of 65 million persons, thus continuing to expand the markets in this area.

Entrance lighting

(Continued from page 31)

illumination.

Architect Gerald L. Bilbro cooperated with the design engineer, Jack H. Murrah, of the Georgia Power Company, in providing a handrail that was channeled to conceal 60-watt lumiline lamps along the sloping section. These were mounted on wiring channel and the circuit wires fed through the pipe uprights.

The resulting illumination provides seeing for safety, as well as a very decorative effect on the front elevation.

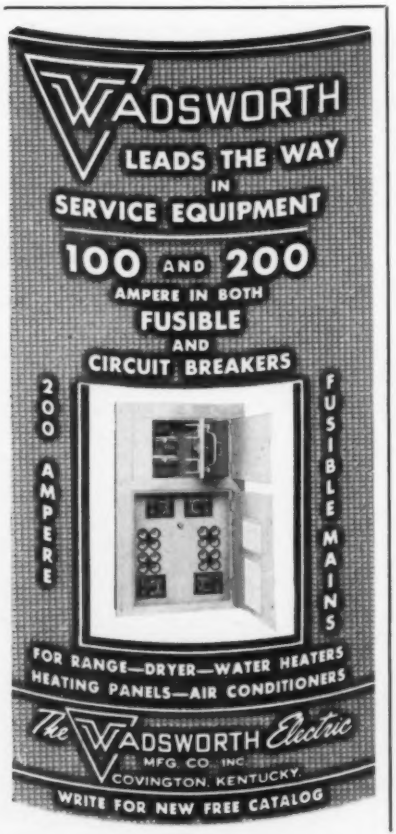
The house is located at 4488 LeConte Avenue in Oglethorpe Estates. Edward A. Barton was the builder, and Nash Electric Company was the electrical contractor. This step lighting was only one of the many features that won for this residence the Light For Living Award of the American Home Lighting Institute in 1956.

Lighting test facility

(Continued from page 36)

unit to form the "T-lighting" configuration.

The premiere demonstration of the new facility was witnessed by approximately 175 state, municipal, and electric utility officials throughout the nation attending the annual Street and Highway Lighting Conference at Asheville and Hendersonville.



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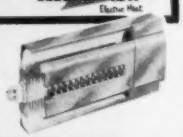

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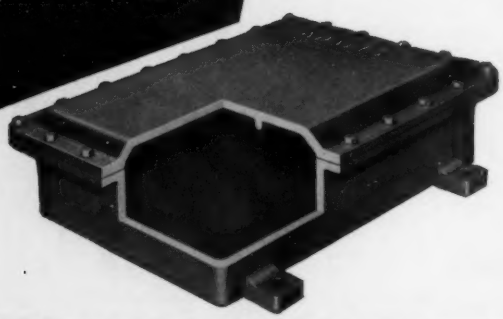

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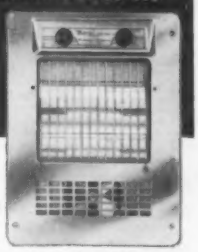

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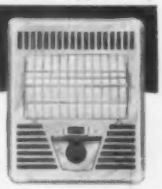

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Kuhlman Elec. Co.
Southern Electrical Corp.

VIRGINIA

Alexandria

Gottemeyer, Warren J.
Thermador Elec. Mfg. Co.

Arlington

Russell, Charles
M & W Elec. Mfg. Co., Inc.

McLean

Dunlop Lighting
Revere Elec. Mfg. Co.

Richmond

Crews, L. J.
Murray Mfg. Corp.
O. Z. Elec. Mfg. Co., Inc.

Ferguson, Lynn W.
Wheeler Reflector Co.

Fishburne, Robert W.
B & C Metal Stamping Co.

Lassiter Sales Co., W. H.
Atlantic Conduit Fittings Co.
King Mfg. Co.
Prescolite Mfg. Co.

Mayo, Paul, Jr.
Blackhawk Industries

Roach, Leo A.
Steber Mfg. Co.
Western Insulated Wire

Rumsey Elec. Co.
Delta-Star Elec. Div.

Simpson & Son, Paul
Ideal Industries, Inc.

Sullivan, William, Jr.
Adalet Mfg. Co.
Frank Adam Elec. Co.

Turner, Harris
Edwin F. Guth Co.

Roanoke

Rumsey Elec. Co.
Delea-Star Elec. Div.

Warwick

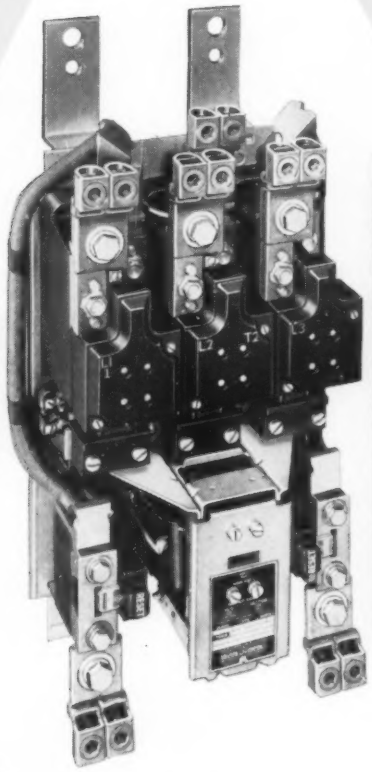
Johnson, S. C.
Elliott Elec. Prods. Co.

WEST VIRGINIA

Huntington

Muller, Harper & Assoc.
Burndy Corp.

NEW



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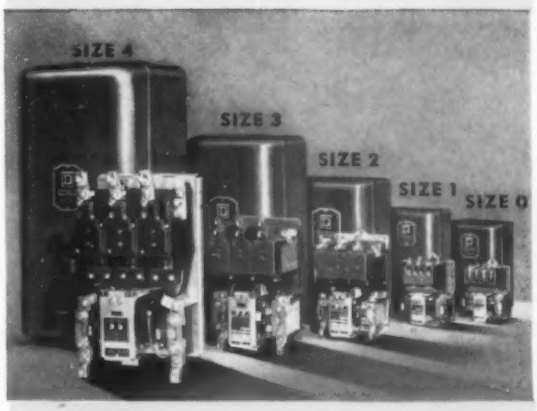

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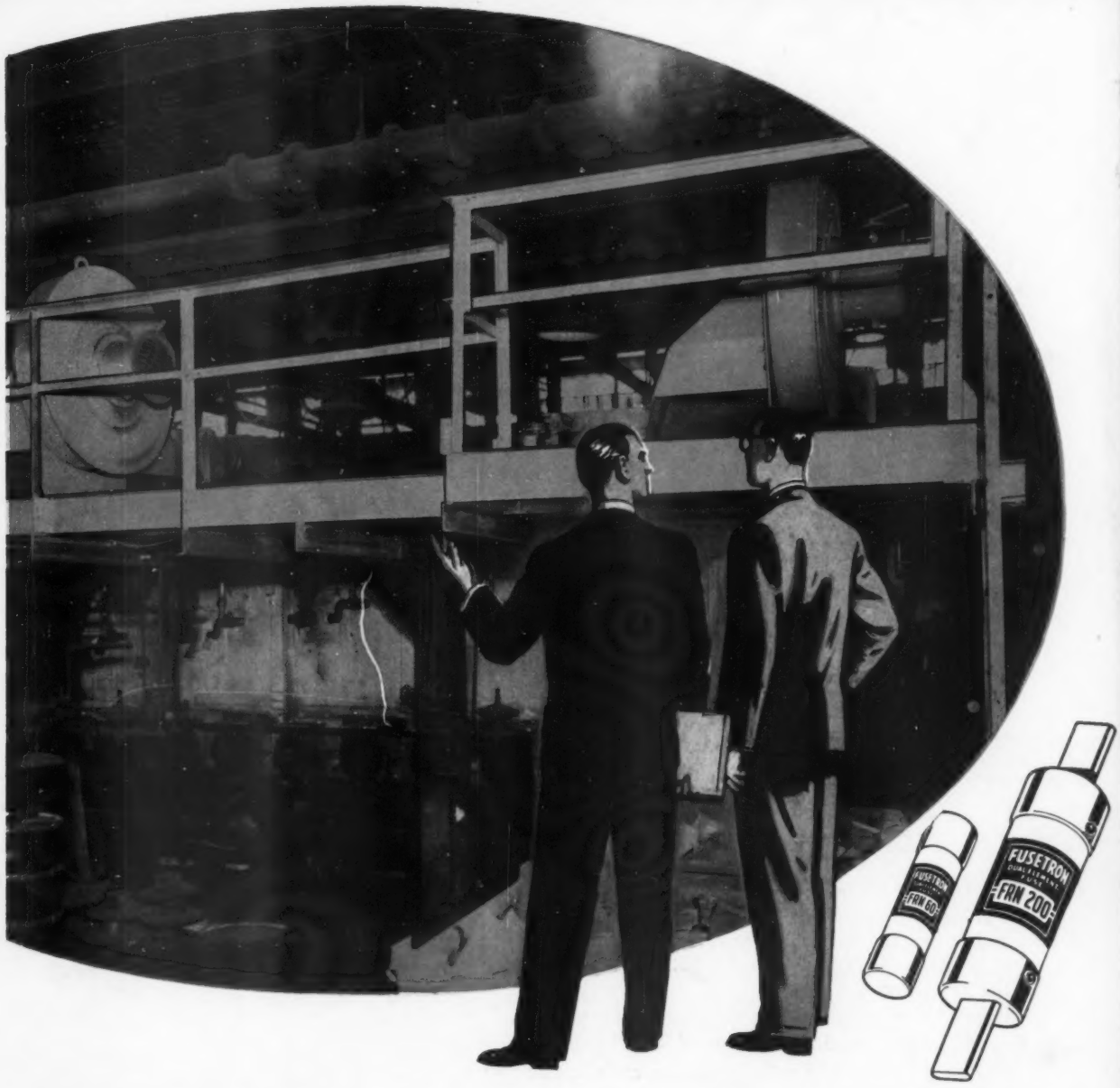

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